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Registration can be obtained by graduates of the Faculty of Applied Science, University of Toronto, holding the Degree of B.A.Sc. as soon as they can submit evidence of satisfactory practical experience.

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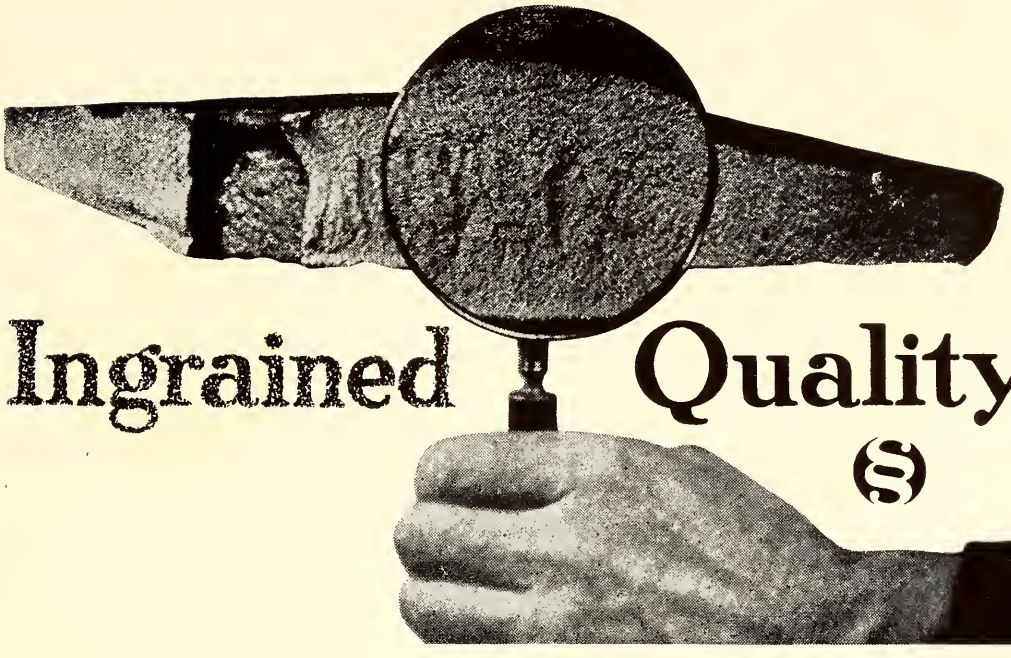

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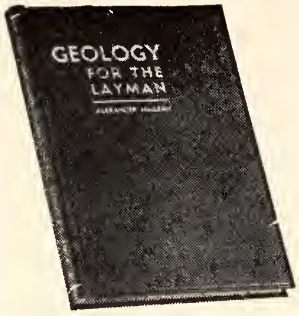

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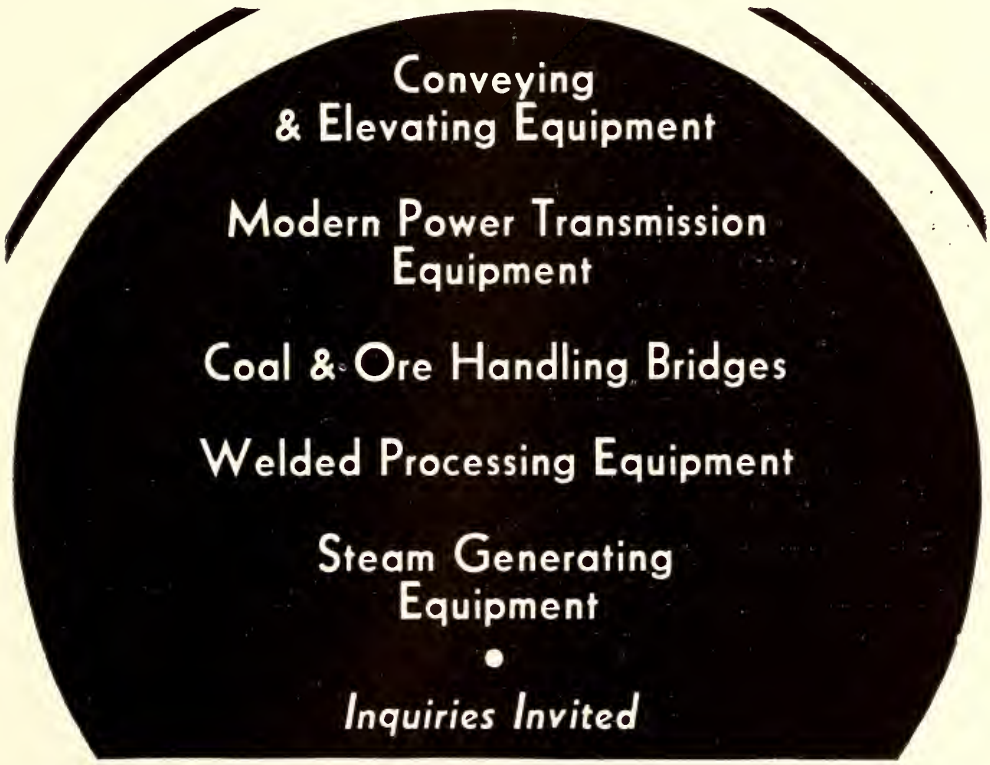

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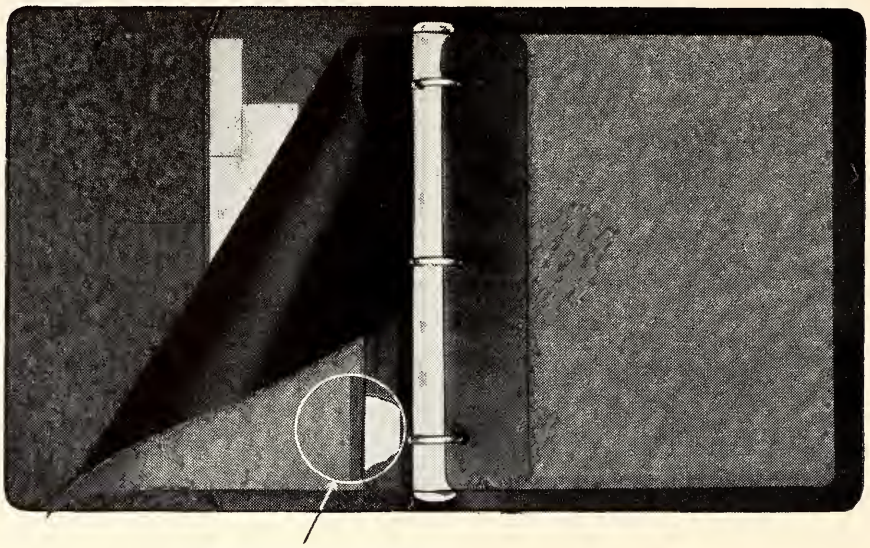

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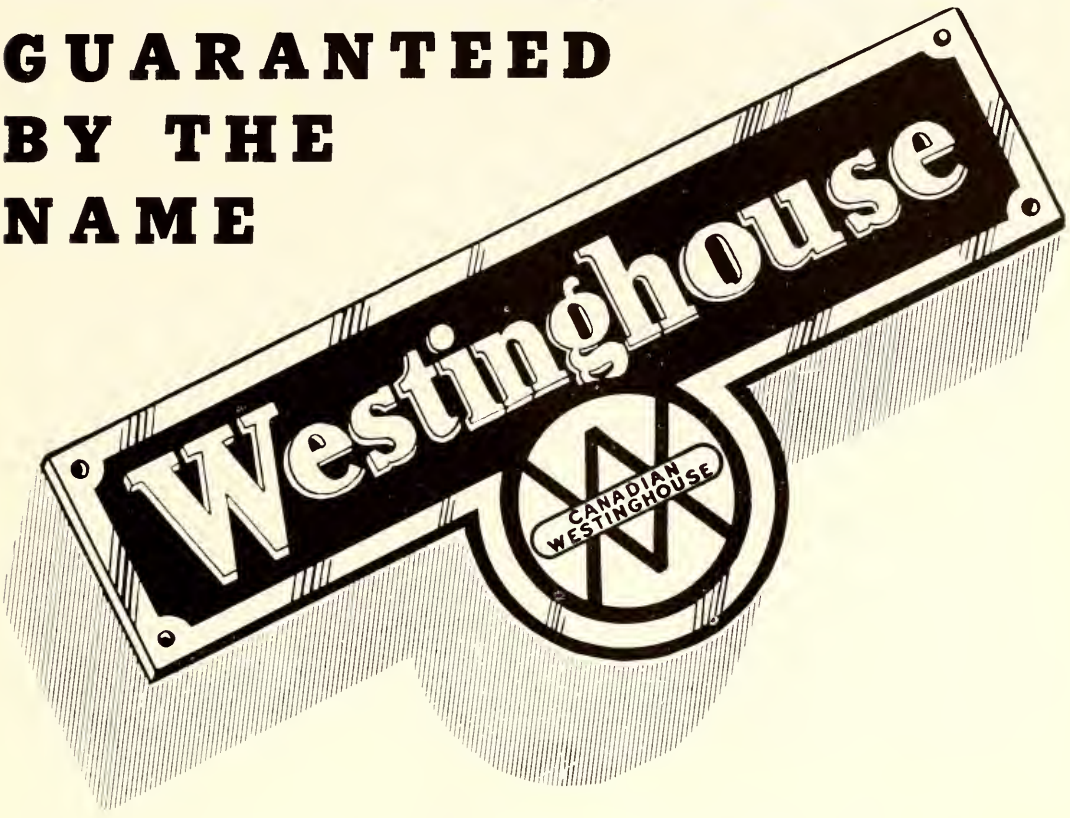

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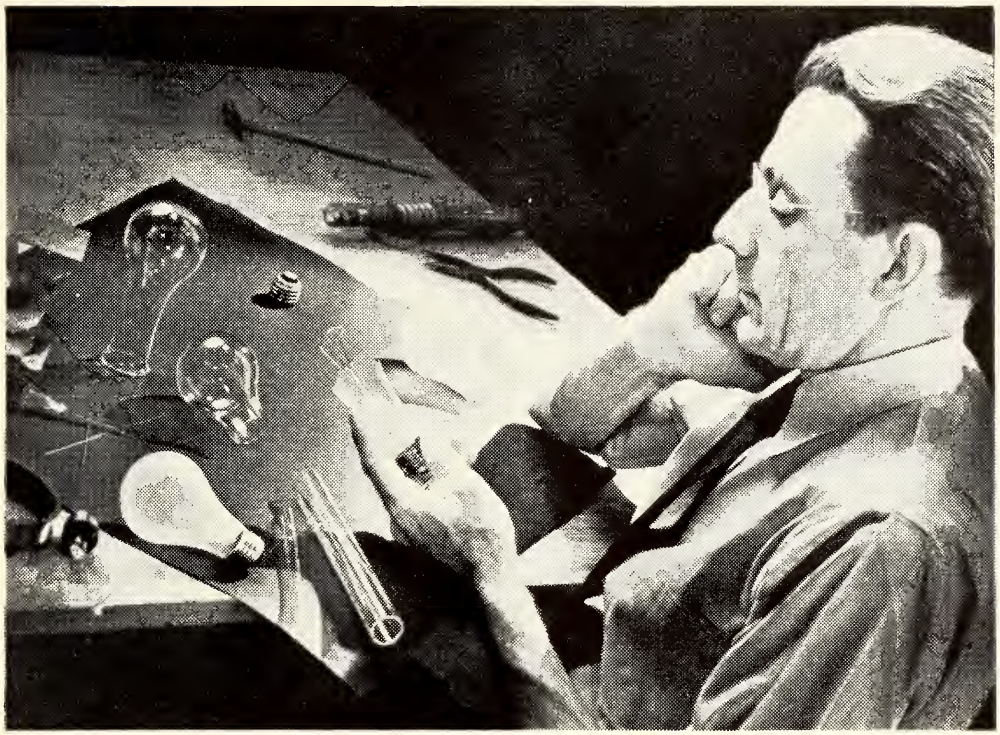

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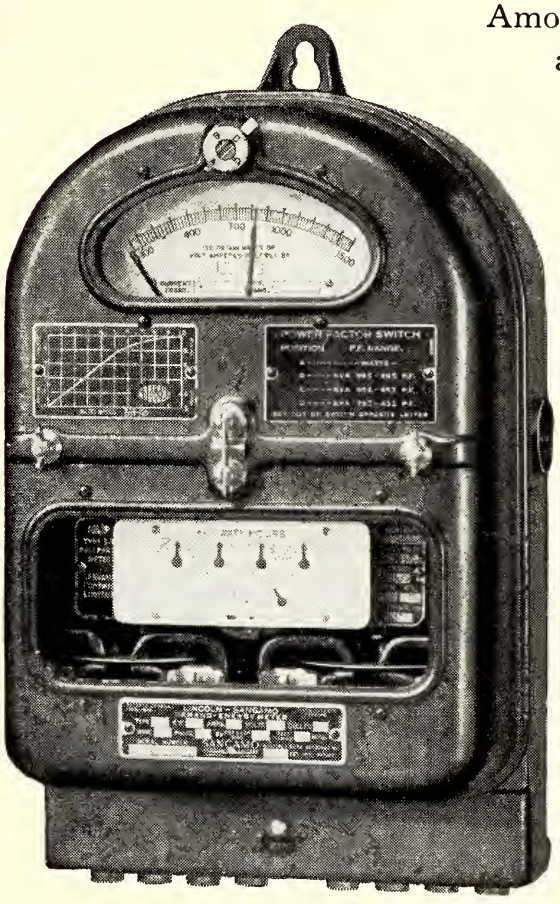

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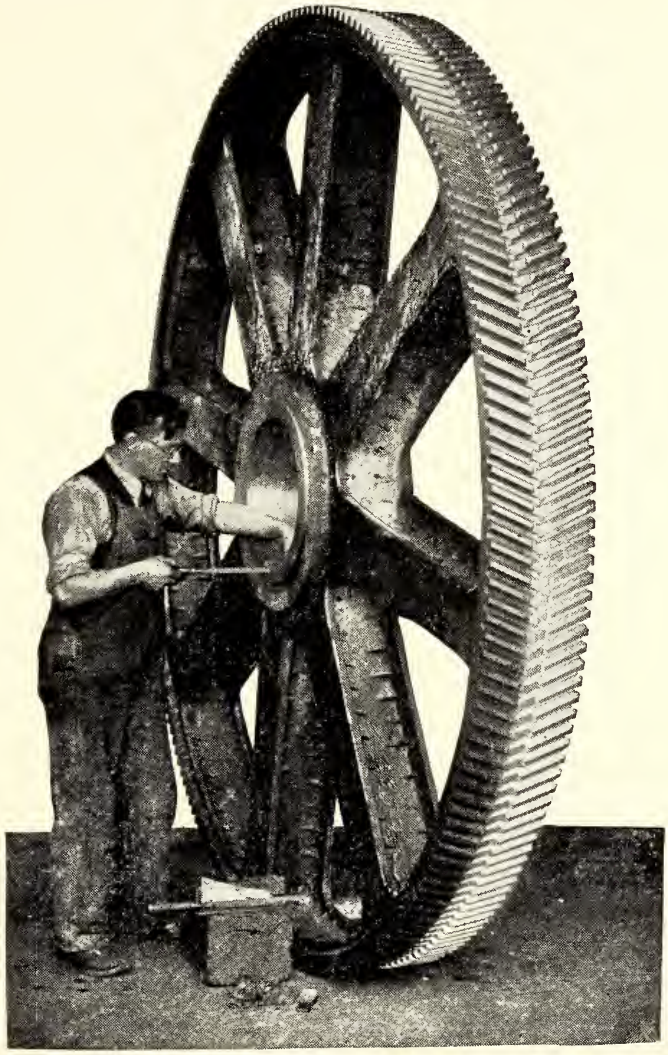

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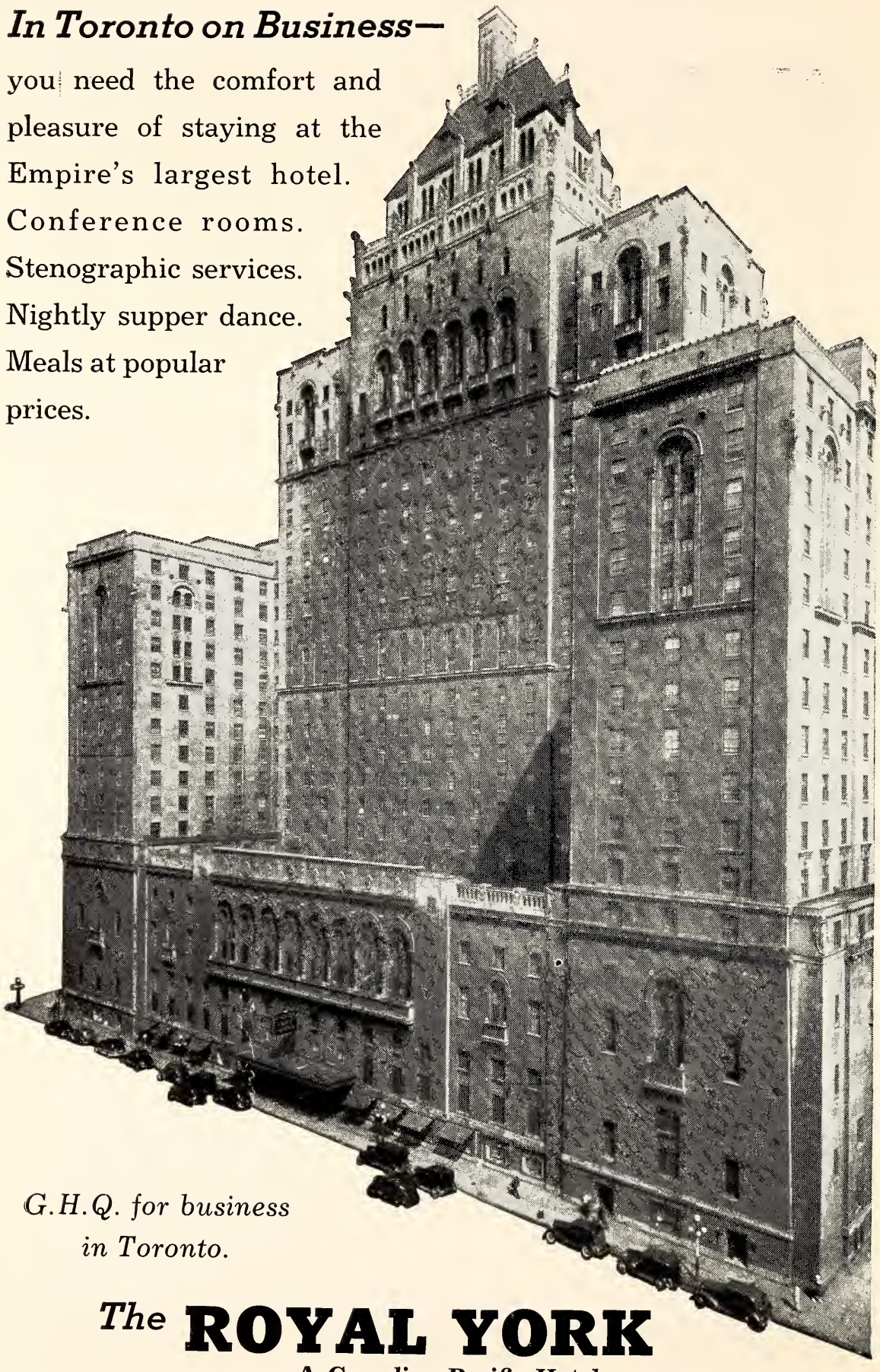

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The Canadian Red Cross Society

The Canadian Red Cross Society is both a peace-time and a war-time organization. Its peace-time work includes the care of sick and wounded soldiers, the maintenance of outpost hospitals on the frontiers of civilization, home-nursing classes, dental clinics, nutrition classes, soldiers' clubs and Junior Red Cross work.

About a million dollars is raised by voluntary subscriptions every year for the maintenance of this peace-time program, but when the war came it was necessary to provide also for the proportionately heavy calls of war-time emergencies. In November the Society asked for $3,000,000 and the returns already approximate to, if they do not exceed, $5,000,000. In the Great War it raised and spent, in cash and kind, $35,000,000.

Working in collaboration with the Canadian Department of National Defense, the Canadian Red Cross is building what will be known as No. 1 Canadian Red Cross Hospital at Taplow, England, a few miles outside of London. This will be a 600-bed institution of the most modern type. It has also furnished a number of ambulances to the fighting forces.

Dr. Fred W. Routley, the National Commissioner, has recently visited Europe, where he consulted with the Canadian Red Cross Overseas Advisory Committee in London, England. This committee is headed by the Right Honorable R. B. Bennett and Sir Edward Peacock, and is making provision for the accommodation and recreation of Canadian soldiers on leave in London. In co-operation with the British Red Cross, assistance has already been extended to the beleaguered Finns and to Polish and Czecho-slovakian refugees. Arrangements are being completed for the distribution of comforts to soldiers not only in the British Isles but in France, as well as to prisoners of war.

The Canadian Red Cross Society enjoys the universal confidence of the Canadian people. In its present, double task, it aims at retaining that confidence to the full. It took the lead at the outset of the war in establishing what is called the Red Cross War Council, which includes the following organizations:

Canadian Legion of the B.E.S.L.
Canadian Legion War Services, Inc.
Canadian Medical Association
Canadian Nurses' Association
Canadian Welfare Council
Catholic Women's League
Baptist Church in Canada
Canadian Jewish (Congress)
Church of England in Canada
Presbyterian Church in Canada
Roman Catholic Church in Canada
The Salvation Army
The United Church of Canada
Federated Women's Institutes
La Fédération des Femmes Canadiennes-Françaises
Hadassah Organization of Canada
Jewish Council of Women
I.O.D.E.
League of Nations Society
National Council of Women
St. John Ambulance Association
Save the Children Fund
Victorian Order of Nurses
Voluntary Registration of Canadian Women
Y.M.C.A.
Y.W.C.A.

Roll of Service

The compilation of a Roll of Service of graduates and ex-students of the School at this stage is beset with several difficulties. It has been impossible in the time available to even hope to make a complete roll. Moreover, even when it has been ascertained that a man is serving in the army, navy, or air force, it is often impossible to obtain information as to his unit or rank.

In this roll of service, the plan has been to include the names of only such men as are enlisted for active service.

Unfortunately, there are probably a number of names which have not come to our notice which should be included.

We wish to acknowledge the very kind co-operation of the Record's Office of the University of Toronto which has been invaluable in compiling this roll of service. We also thank Professors T. R. Loudon, W. J. T. Wright, and G. O. Smith for their advice and assistance.

GREG. MAHER

Our first casulty directly attributable to the war in Europe. Pilot Officer Gregory T. Maher 3T9, was carried to his death in a crashing bomber at Trenton, on November 29th, 1939.

Born in North Bay 29 years ago, "Greg." as he was known to his wide circle of friends attended St. Mary's Separate School and North Bay Collegiate Institute before coming to Varsity.

While attending School in the department of Mechnical Engineering, he was very active in the Canadian Officers' Training Corps, where he attained the rank of Lieutenant in C. Company. This work brought out his natural aptitude for military studies and won him certificates in three arm Infantry, Artillery Survey, and Artillery. Though greatly interested in his academic work, Greg found time for a variety of University social activities, especially undergraduate theatrical productions.

For two years he lived at Knox College, prior to going into residence at Kappa Rho Tau Fraternity.

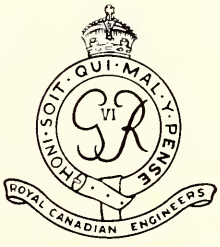
Immediately after graduating, he joined the Royal Canadian Air Force and trained at Winnipeg and Camp Borden.

Roll of Service

Annis, C. L.	'36	P.O.	R.C.A.F.
Austin, C. C.		P.O.	R.C.A.F.
Baker, L. P.	'35	Lt.	R.C.O.C.
Baker, M. H.	'23	Lt.	R.C.O.C
Baird, L. T.		Lt.	R.C.O.C.
Barnes, L. F.	'16	Lt.-Col.	R.C.E.
Bartlett, T. S.	'37	P.O.	R.C.A.F.
Baxter, W. J. F.	'24	Capt.	R.C.C.S.
Beament, G. E.	'31	Major.	R.C.A.
Beck, J. B.	'26	Lt.	R.C.E.
Beecroft, G. W.	'23	Major.	R.C.O.C.
Bell, A. A.	'23	Major	Staff
Bodwell, G. L.	'37	Lt.	R.C.E.
Boehm, C. R.	'23	Lt.	R.C.O.C.
Bourchier, B. V.	'33	F. Lt.	R.C.A.F.
Bleaken, W. C.	'38	Lt.	R.C.O.C.
Bradford, J. K.	'32	Capt.	R.C.O.C.
Brenneman, A. G.	'31	Lt.	R.C.C.S.
Briggs, E. R.	'36	P.O.	R.C.A.F.
Burden, H. J.	'15	Wg. Com.	R.C.A.F.
Burness, K. C.	'24	Lt.-Col.	G.H.Q. Staff
Butterill, H. J. Mc.	'40	Lt.	R.C.O.C.
Catto, D. E.		Major	R.R.C.
Catto, John		Capt.	R.C.C.S.
Clandinan, J. W.	'34	Lt.	R.C.O.C.
Conover, J. D.		Lt.-Col.	R.C.C.S.
Cooper, J. M.		Capt.	R.C.A.
Cornell, P. J.			R.C.O.C.
Cory, R. Y.	'08	Major	48th
Darling, W. W. G.		Capt.	48th
Elms, George	'39	P.O.	R.C.A F.
Evans, M. M.	'23	Major	Ont. Reg. Tank
Fox, J. H.	'25	Lt.	R.C.O.C.
Galbraith, R. A. H.	'23	Major	R.C.C.S.
Gannon, J. L.			R.C.A.F.
Gilroy, F. W.	'33	Lt.	R.C.C.S.
Gross, R. F.	'35	F. Lt.	R.C.A.F.
Haldenby, E. W.	'21	Lt.-Col.	48th
Hanning, J. R.	'23	Major	R.C.E.
Hawtrey, R. C.	'29	F. Lt.	R.A.F.
Hayman, H. L.	'23		R.C.E.
Hemphill, J. L.	'38	Sub.-Lt.	R.C.N.V.R.
Hendrick, M. M.	'32	F. Lt.	R.C.A.F.
Hertzberg, C. S. L.	'05	Lt.-Col.	R.C.E.
Hertzberg, H. F. H.	'07	Maj.-Gen.	G.S.
Higbee, J. C.	'23		R.C.A.F.
Holman, D. M.	'40	P.O.	R.C.A.F.
Hunter, A. F.	'27	Capt.	Perth Regt.
Huggins, F. W.	'23	Lt.	R.C.O.C.
Jacobi, G. W.	'31	F. Lt.	R.C.A.F.
Jewett, E. S.	'32	Lt.	R.C.C.S.
Johnston, G. W. F.	'15	Lt.-Col.	R.C.A.

Roll of Service

Junkin, R. L.	'11	Major	R.C.E.
Keefer, T. C.	'39	Lt.	R.C.A.
Laurie, W. L.	'24	Lt.-Col.	R.C.C.S.
Lynn, S. L.	'39	Lt.	R.C.E.
Macklin, W. H.	'24	Major	R.C.C.S.
Maher, G. T.	'39	P.O.	R.C.A.F.
McArthur, A. A.	'39	Lt.	R.C.C.S.
MacDonald, D. M.	'21	Lt.	R.C.A.
Martin, W. C.	'27	P.O.	R.C.A.F.
McEwen, F. W.	'37	Lt.	Ont. Tank Regt.
McHugh, W. T.		Capt.	R.C.A.
McIntosh, J. H.	'23	Major	R.C.A.
McKay, H. A.	'23		R.C.E.
McLean, K. C.	'36	Lt.	R.C.C.S.
McManus, H. W.		Captain	Staff
McQueen, M. V.	'23	Lt.-Col.	C.A.S.C.
Meighen, M. C. G.	'30	Captain	R.C.O.C.
Millard, V. S. J.	'34	Fl. Lt.	R.C.A.F.
Miller, H. A.	'34	Lt.	R.C.C.S.
More, G. K.	'38	P.O.	R.A.F.
Morris, D. F.	'27	P.O.	R.C.A.F.
Murphy, F. A.	'36	Capt.	R.C.O.C.
Nash, A. L. S.	'22		R.C.H.A.
Neelands, R. E.	'36	Corp.	R.C.E.
Orok, J. R.	'39	Sub.-Lt.	R.N.
Pearson, J. W.	'26	Lt.	R.C.O.C.
Price, A. V.	'23	Lt.	R.C.C.S.
Ridell, D. B.	'39	P. O.	R.C.A.F.
Robertson, E. E.	'39	P.O.	R.A.F.
Ross, D. B.	'38	Sub-Lt.	R.N.
Rous, C. C.	'13	Major	C.A.D.C.
Rowland, J. N.	'40	Sub.-Lt.	R.C.N.
Salter, W. A.	'39	Lt.	Staff
Sampson, F. A.	'27	Fl. Lt.	R.C.A.F.
Sebert, L. M.	'40	Lt.	R.C.A.
Sharp, C. T.	'24	Major	Lorne Scotts
Smart, G. W.	'23	Capt.	R.C.C.S.
Smith, G. E.	'30		R.C.E.
Smith, K. W.	'37	P.O.	R.C.A.F.
Thompson, C. C.		Lt.-Col.	Tor. Scottish
Thompson, H. G.	'22	Lt.-Col.	R.C.O.C.
Thompson, W. L.	'24	Capt.	R.C.O.C.
Truman, J. T.	'35	Capt.	R.C.O.C.
Waddell, R. C. A.	'39	P.O.	R.C.A.F.
Wait, G. G.	'20	Sqd. Ldr.	R.C.A.F.
Walkey, G. W.	'37	P.O.	R.C.A.F.
Wallbridge, C. L.		Capt.	Hast. & P.E. Regt.
West, F. R.	'34	Fl. Lt.	R.C.A.F.
Weston, J. F.		Lt.	R.C.O.C.
White			R.C.E.
Williamson, J. E.	'40	Lt.	R.C.O.C.



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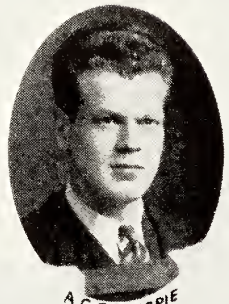

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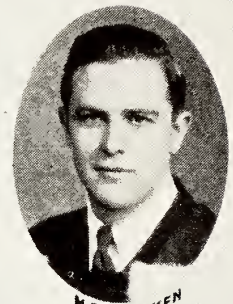

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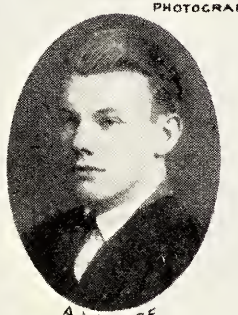

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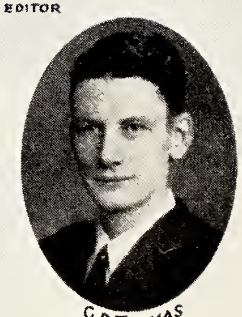

G. D. THOMAS
ASSOCIATE EDITOR

TRANSACTIONS AND YEAR BOOK

of the

University of Toronto Engineering Society

No. 53 APRIL, 1940

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Comparisons between a college education and a trip to some unfamiliar destination have often been drawn. In other times, the various stages of university life have been likened to the speeding of trains or the sailing of ships, but in 1940 the complex patterns of our lives pass by with such startling rapidity that the illusion is rather one of flying,—sometimes at such a height that events seem to have come and gone below and to have left us with no more than rather vague impressions and disturbing recollections, and at other times, so low that we are in constant and intimate touch with all the myriad scenes and actions of our surroundings.

For some of us the airport at the end of the route is coming into sight, while for others this stop will be only one of a series. All of us, however, feel at some time an almost sentimental urge to sit back and review in retrospect the sights we have seen and the things we have done while on this leg of our flight. So, relax and remember with this volume of TRANSACTIONS, which is, in effect, a combination diary and album of the highlights of School for 1939-40.

The compilation of the material in these pages has afforded us a great deal of pleasure, and has led us to a deeper insight and understanding of the natures and characters of the men with whom we have "gone to school" for the past four years.

Here you will find the records of most of the phases of life at

S.P.S. Appropriately, the book is introduced with a roll of those men who, having absorbed the spirit of "one for all", of which we are so justifiably proud here, have offered their services in a truly engineering project which will undoubtedly have varying degrees of effect upon us all. We can truthfully say that the inception of this war was not our responsibility, but just as truthfully, it is up to each of us to exert every effort to support these men in a determination to effect a satisfactory culmination of it. We are proud to be able to present our Roll of Active Service to you, and have purposely placed it in the position of honor in the book.

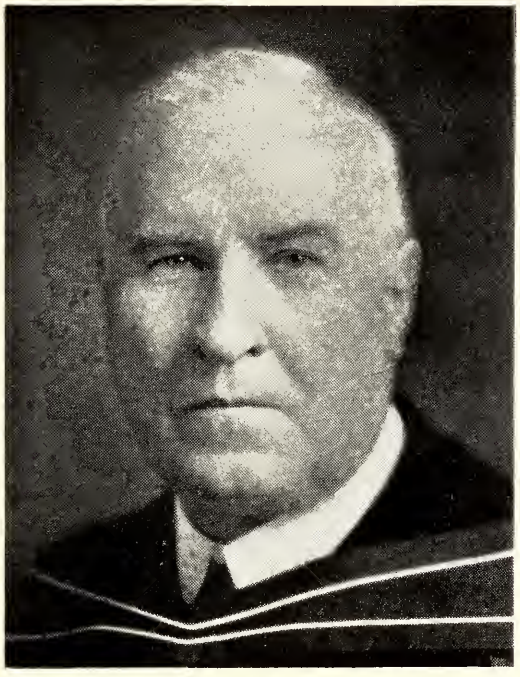
A somewhat different policy has been adopted this year with regard to that part of the book devoted to TRANSACTIONS. A chief criticism in the past has been that this section has not held enough material of general interest to every Schoolman. In this edition you will find some articles of a widespread interest which have been written for TRANSACTIONS by men in the field. It is hoped that this combination of outside opinion with that expressed in the papers presented by under-graduates and members of the staff will find favorable acceptance.

THE YEAR BOOK has also been overhauled and, we hope, most of the weak parts have been replaced. Our fair and ambitious co-eds have at last received a modicum of "official" recognition, and from here on there seems to be nothing that can be done to stem the invading tide. The graduating classes in the various departments will be found grouped together for the first time—to save you all that pawing through pages to find someone. All the clubs and social functions seem to have met with great successes this year, which just goes to show that, war or no war, a Schoolman must have his fun. And the sports—sweat and blood for the blue and gold—a credit to School once again.

The Board of Editors presents this TRANSACTIONS AND YEAR BOOK to you with the hope that another year's history of our faculty has been faithfully recorded. To all who have contributed we are deeply grateful. To our assisting editors, who have spent most freely and cheerfully of their time, and have spared no efforts in its prepartion, may we extend our personal, heart-felt gratitude. Finally, to our successor, Alex. Lambe, we offer our best wishes for every success in the heavy responsibility he will be called upon to bear.

A. G. GILLESPIE.

A Message from the President



Once more, through the publication of THE TRANSACTIONS AND YEAR BOOK, it is my privilege to send good wishes to the members of this great Faculty of Engineering, and more especially to congratulate those who are so soon to enter upon their professional careers as graduates of the University of Toronto. This I do with all my heart.

During the academic year we have welcomed to the department of electrical engineering Mr. Cass-Beggs, who has come from Oxford bringing his own special training and experience as a contribution to our common undertaking. He, his wife and child, were on the *Athenia* when she was sunk by a German submarine—a characteristic illustration of our enemy's policy of "frightfulness"—but happily they were saved and reunited on this side of the ocean.

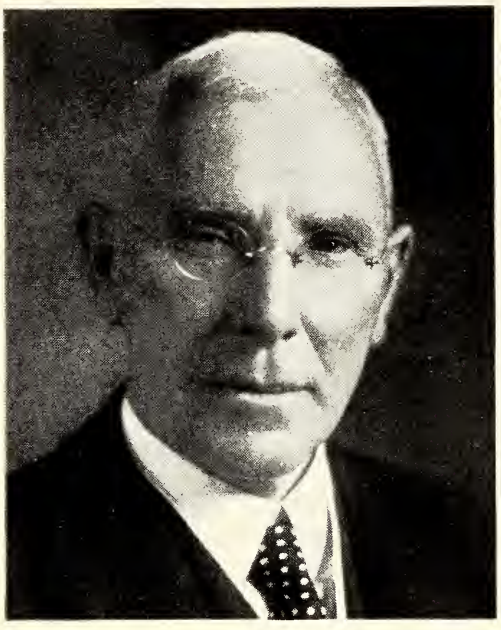
Probably the most interesting feature of the year's work has been the engineering survey made by Professor Dugald C. Jackson, for twenty-eight years the head of the department of electrical engineering in the Massachusetts Institute of Technology. Professor Jackson confirms the view that our teaching staff is among the best on the continent, and proceeds to make

many valuable suggestions on the best use of our present resources, on readjustments in our teaching programme, on the need of additional accommodation and equipment, and on the desirability and practicability of keeping "The School" in still closer touch with our alumni and with the industries in general. He has spoken gratefully of the co-operation he has received from the staff, the students, and the graduates. I feel sure that his survey and the adjustments which are now being made will mark a new forward step in our engineering education. The outcome will doubtless be that, as in medicine, there will be some diminution in the number of lectures, in order that students may have more time for reading and reflection; more opportunity for research on the part of both staff and students; better facilities for both graduate and undergraduate training; and closer continuous contact with the outside world of industry. He emphasises the value of more extensive work in English and in economics. He is sure that we have the possibilities of becoming one of the chief centres of engineering education on the continent; and I am sure that we all—staff, students and graduates—are determined to make these possibilities a reality.

You are the free subjects of a great profession. It demands of you resourcefulness, initiative, accuracy, thoroughness, honesty and determination. It calls for deeds as well as words. These are the qualities which citizenship in a democracy requires. The triumphs of applied science have brought comfort to many, but they have also brought grave problems. Who better than you can be expected to help solve them? Who more than you can link the efficiency of the engineer to leadership in human relations? You are needed in days of war both in the field of battle and on the home-front of supply; you will be equally needed in days of peace to discover, to conserve, and to develop the material wealth of Canada, and at the same time to make Canada a nation wherein shall dwell justice, truth, unity, and fine human inter-relationships. This is the challenge of citizenship to the engineer. Long ago the Spartan youth was confronted with his heritage and his duty—"Spartam nactus es: hanc exarna". "You have won Sparta as your own—adorn it". So today, to Canada's youth the challenge rings out: "You have Canada as your heritage, adorn it".

H. J. Cody,
President

The Dean's Message for 1940



To the Members of the Engineering Society

GENTLEMEN:

Again the Engineering Society may record a very successful year, not only in its regular society meetings, but in its various social functions and other student activities. We must always bear in mind that the Engineering Society of this great Faculty forms a really integral part of it and carries its responsibilities as an important link between the Staff of the Faculty and the Student body itself.

The responsibilities of the Engineering Society have considerably increased the past few years, especially in the greater development of its Clubs as furthering the more particular interests of the various branches or departments in which the students of this powerful Faculty are organized. The all-embracing Society itself is now, after nearly sixty years, a well established branch of the institution, both in respect to academic work and student welfare and activities generally.

To the President, Officers, Chairmen of Clubs, Executive and Members, I extend my hearty congratulations on the many things they have accomplished during the year. Not the least of these is the maintenance of sound views and steadiness among the student body at a time when all must keep cool and collected,

while there is so much commotion, perplexity and uncertainty as to the future of our Country and Empire. This is a time when clear thinking is needed on all sides. "Schoolmen" may be depended upon to keep steady—it is a part of the Engineer's profession and philosophy of life.

Now with the Second World War six months along, you are all facing a new world, a world which, when you came here, you did not expect to have to face. That you are facing it with courage and resolution is much to your credit. As "Schoolmen" you can be relied upon to carry your duties with distinction wherever you may be—whether here next year or out in the professional world for which you have been preparing. Should you be engaged in the war on the overseas front or here on the home front, you will carry on in the same purposeful way you have followed here the past year. The spirit of the Engineering Society will keep alive whether you be far or near.

Wherever you may be the next year or two, you will have a long hill to climb. Be sure whether out in engineering work or back here at the University, you keep some strength in reserve —physical and mental. Do not tire yourselves with useless exertion. Make sure that every effort counts and that there is no lost time or motion. Everything, everything we have, must be carefully economized and saved for the country and the Empire, both of material and human resources.

So now, you will march along the road, climb the hill where the road takes you to the high places, where you will get a far view. It may be a rough road, the hills may be steep, you will at times get tired and out of breath, but reward will come in being above the turmoil of the valley and you will have the edge on those who have not worked so hard in making distance and height. You will, too, have the pleasure and satisfaction of some one thing accomplished, many things perchance, and that will hearten you for the next, perhaps more difficult, tasks before you.

"Stand straight: step firmly, throw your weight;
The heaven is high above your head,
The good green road is faithful to your tread."

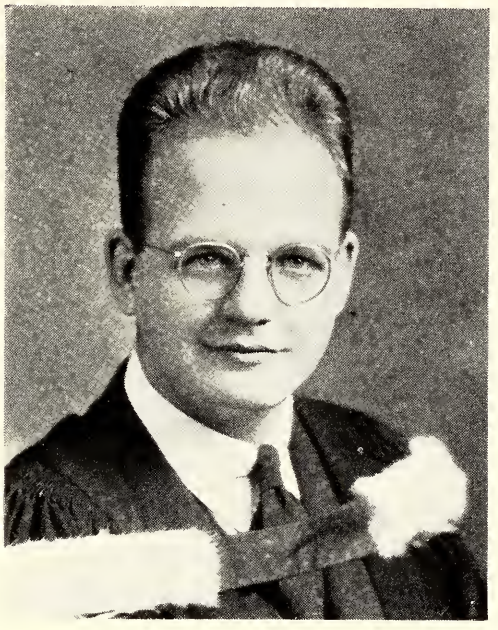
With best wishes for success; good fortune to you all.

Yours faithfully,

C. H. Mitchell,

March, 1940. *Dean.*

The President's Message



It is with a mingled feeling of satisfaction and personal regret that I close the most interesting, joyful, and instructive chapter of my life to date—the chapter embracing my term of office as President of the University of Toronto Engineering Society. It has been a privilege and an honour to serve the nearly one thousand Schoolmen whose singular loyalty to, and co-operation with the Society is an example to undergraduate student organizations everywhere.

If the voiced opinions of the undergraduates, the staff, and actively interested alumni, can be taken at face value, then this year has been outstandingly successful. The measuring stick of success, as I see it, is universal satisfaction. For this expressed satisfaction I take and deserve no individual credit—the credit is due to the eighteen men who make up the Engineering Society Executive, and the committees they appoint and control.

The Executive has worked hard this year. Their meetings, excluding emergency meetings, held at least twice a month, have averaged three to four hours in length—after school hours—and each meeting represented further hours of individual committee preparation. At this time I would like to review the past year for

you, giving a more detailed picture of the Engineering Society's activities than meets the average Schoolman's eyes.

School has witnessed, this session, the finest and best attended School Dinner, School At-Home, School Nite, and Graduation Ball in twenty years. Your wonderful support of these functions has given a great deal of encouragement and satisfaction to the committees who worked so hard to make them enjoyable and memorable occasions of your days at School. The general meetings of the Society and the Club meetings were of high calibre, and your splendid attendance at all of them is proof of your interest, and appreciation of the purpose of these organizations. The Annual Meeting was, this year, reinstated to its original standing as the most important general meeting of the year and it is hoped that it will retain its regained position.

Constitutional amendments have brought about the abolition of the dividend system of distribution of surplus, in favour of a more co-operative supply department which gives you reduced prices on articles of largest sales volume; and also have brought about the abolition of investment and speculation of year funds, and the introduction of annual published audit of these funds.

This year, the third and fourth year became registered Engineers-in-Training of the Association of Professional Engineers of the Province of Ontario, for the first time. A record of each Freshman's capabilities was instituted to be brought to date each succeeding year for permanent file. A new and larger School Song Sheet was published. The thirty-year-old wooden files were replaced with steel cabinets, containing the first really comprehensive set of bound reports. And finally, the publicity was enhanced by the genesis of the Flash Bulletin Service which is intended to make all notices and announcements more obvious to the casual passerby.

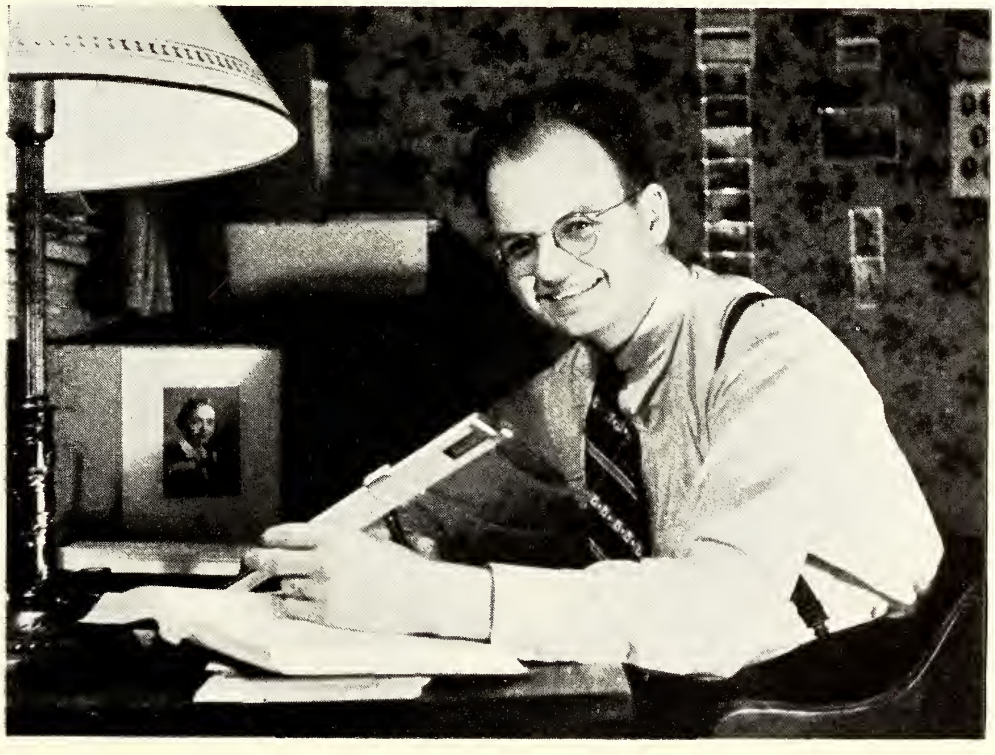
Probably the most important contribution of the Engineering Society to School this year was the presentation to Dr. Dugald C. Jackson, of the Engineering Society Brief of Student Opinion on Curricula. This report was compiled for Dr. Jackson, Professor emeritus of M.I.T., and foremost authority on Engineering Education in North America, as the undergraduate contribution to his survey of S.P.S. for the Board of Governors. This Brief is now receiving the serious consideration of the Faculty Coun-

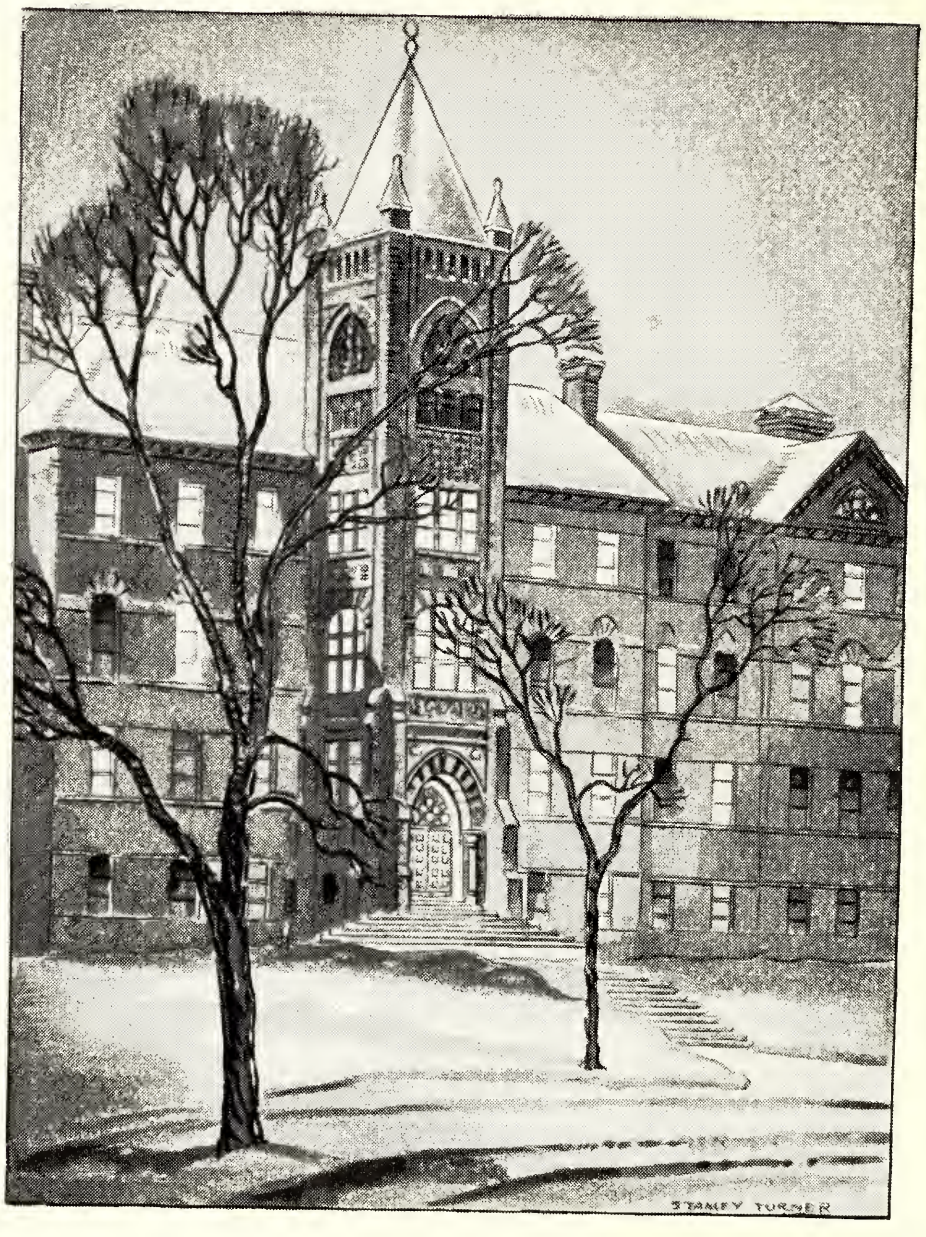
cil's Committee on Revision of Curricula, a development brought about by Dr. Jackson's work.

This year has seen the advent of another world war. School has obeyed to the letter the wishes of President Cody and Dean Mitchell. School has seen the enlisting of four of her finest men, Bee Rowland, Hal Butterill, Jack Williamson, and Lou Sebert, commissioned in Active Service—and three others have been sent to active war engineering work. And by special effort, School has given generously to the Canadian Red Cross Society.

Why is the Engineering Society, which phrase is synonymous with School, so active and alive? The answer is—SCHOOL SPIRIT — that intangible bond of unity, that living tribal influence which is tradition, and at the same time reality, which becomes part of the very soul of every Schoolman, engendered while at college, and which remains with him up to the Ultimate Breaking Strain. Can you see why it is with selfish reluctance that I turn over the battered brass gavel to the new executive? I know, however, that the task is going into the capable hands of Bruce Davis and his exceptionally fine group of cohorts. May they obtain the same gleanings of experience, and the same priceless fellowship that has been my good fortune to enjoy this year.

SYDNEY M. S. DUNN.




STANLEY TURNER

TRANSACTIONS

1940

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ENGINEERING SOCIETY

THE UNIVERSITY OF TORONTO

Engineering Society Meetings

October 23rd

At the first meeting of the year Mr. Wilson Woodside, a prominent journalist, spoke on current events in an address entitled, "How Long Can Germany Last?"

November 2nd

Mr. W. J. Davidson, Research Director and General Sales Manager of the Diesel Engine Division of General Motors Corporation, spoke on the "Mechanics of the Two Cycle Diesel Engine and Its Commercial Application."

November 8th

The guest on this occasion was Mr. Gordon Scott of Imperial Oil Ltd., who presented a motion picture about lubrication. entitled, "The Inside Story."

December 8th

A graduate of S.P.S., connected with the Sales Department of the International Nickel Co. of Canada Ltd., Mr. Ken Clark, showed motion pictures of the various operations of that company.

January 8th

The address of this meeting, given by Mr. W. A. Duncan of Dominion Oxygen Co. Ltd., is written in full in the Transactions of this book, entitled, "Industrial Applications of the Oxy-Acetylene Flame."

February 1st

The guest speaker on this occasion was Mr. J. Rowat, the Sales Manager of S.K.F. Ltd., and his interesting address was entitled, "Sales Methods at S.K.F."

February 7th

Mr. S. W. Davidson, a graduate of University College, who is the Business Manager of the Research Laboratory of the Eastman Kodak Co., spoke on the work of his department.

February 13th

A graduate of S.P.S., Dr. Saul Dushman, showed lantern slides and gave an address on "General Electric Research."

March 18th

At the last meeting of the year, an eminent graduate, and for many years the Professor of Mining of S.P.S., Professor H. E. T. Haultain, was the speaker.

The Engineer In Industry: *His Preparation and Performance*

BY ROBERT W. ANGUS, HON. M.E.I.C.

The engineer is largely responsible for modern industrial advancement and has been an unwitting contributor to whatever beneficial or harmful effects accompany our present industrial conditions.

The military engineer's duty, while largely confined to problems of offense and defense, has led him to exert a beneficial effect on civil life, partly perhaps, unconsciously, but roads, bridges, highways, canals and waterways so essential in warfare are also of inestimable value in times of peace and have contributed greatly to our convenience and happiness as well as to our prosperity.

The civil engineer's problems, so far as the writer views them in a broad way, have been those contributing to the comfort, cleanliness and transportation of the masses, to their convenient housing and adequate health protection; it is he who has built the railroads, bridges and structures of various kinds, and one can scarcely think of any work he does that does not add greatly to the prosperity and health of the masses. The mechanical engineer has always had to do with industrial problems, the production and use of machinery, the design and operation of power generators of various sorts, the handling of labour and the problems involved in the installation and operation of labour saving devices; generally, he deals with problems connected with shops and workmen; with men and processes inside closed buildings, while the civil engineer works mainly out of doors. It therefore follows that, as most labour troubles occur in shops, the mechanical engineer has not always been looked upon as an unmixed blessing, and if the public knew just exactly how to designate him, he would come in for more abuse than he does now.

The origin of the engineer's connection with industry was with the first construction of machines, at the very beginning of history many years before the Christian era, and what a mystery must have appeared to the ancients in the machine. *There it stood, an inanimate thing, incapable of motion or power of its own accord,

*From Reuleaux "Kinematics of Machinery", translated by A. B. W. Kennedy. Other parts of this section from the same book, which has been long out of print.

and to all appearance dead; then, when it was attacked by an external force it immediately sprang into life to defend itself; hidden forces exerted themselves to save it from destruction and to help transmit the attacking force to some useful place; when the attacking force ceased the hidden forces again resumed their sleep and the machine again became inanimate. Schiller's riddle about the spark may be slightly revised and applied thus:

"Sleeping, yet ready for the expectant foe,
I lie concealed within my iron walls;
He comes, he feels my iron weapon's blow,
We fight; I sleep again, for soon he falls."

The simple machines, so often referred to in mechanics, are the wheel and axle, the lever and the screw, and of these the wheel was in use at such an early age--at least 5000 years ago—that history does not go back far enough to tell us the origin of it, but it probably had to do with early forms of worship in the "praying wheel" (making of fire). At an extremely early period the wheel was used on chariots and other conveyances, and many drawings of elaborately decorated chariots are shown on ancient pottery of 1700 B.C., the design of the wheels offering much scope for ingenuity. A wheel and axle are shown on an early engine described by Hero in 150 B.C., and the undershot water wheel and a form of pump for irrigation are of great antiquity. The tire plays a very important part in the construction of the wheel; thus, in Homer's Iliad V, there is the following description of the chariot of Juno:

"Quickly Hebe fixed on the chariot the rounded wheels
Of copper, eight spoked, around an iron axle;
Their felloes, indeed, were of gold, imperishable, but around
Tires of copper were firmly fitted, a wonder to behold."

The lever appears to be of considerably later origin, but early examples show it employed as a form of walking beam, to help lift water and the ancient Egyptians used it in connection with oars for rowing boats. The screw appears first as a method of storing energy for firing missiles in warfare and it seems to have followed the other machines by some years, but it was not long after the simple machines were made that they became fully constrained as to their motions and then were combined into more complete machines.

When holes had to be drilled, the simple drill with a bow was

used, as mentioned in Homer's Odyssey IX (about 1000 B.C.) in this way: (Three men were required.)

"I, standing above them
Bored it into the hole; as a shipwright boreth a timber,
Guiding the drill that his men below drive backward and forward
Pulling the ends of the thong while the point runs round without ceasing."

The machine is thus of great antiquity, and as the early peoples increased in numbers and began to settle in communities, transportation and military problems increased in importance; water had to be obtained and stored, and improved methods of making various types of equipment became essential and taxed to the full the genius of the more intellectually minded.

Power development was somewhat slower than other engineering works, for in the early days slaves were very numerous and war prisoners were so plentiful that any task could readily be carried out with the help available. When more than human labor was necessary, animals could be used and thus ample energy was available. Both water power and heat power became important as the inhabitants settled down in more definite locations and required supplies of ffour, coal and similar materials for their existence; these supplies having to be prepared in mills or brought to the surface by machinery.

We then come to the last two hundred years of history. The scientific world had been much enriched by the work of Archimedes 250 B.C.; Galileo 1564-1642; Pascal 1623-62; Newton 1642-1727, and Euler, who were followed by Weisbach, Rankine and others. Weisbach and Rankine wrote monumental books between 1848-1860, approximately, and laid down the important theoretical groundwork for engineers to build on, but it is important to note that long before these books appeared, the steam engine was a comparatively efficient machine, water turbines had been made by Boyden with an efficiency of 88 per cent, the locomotive had been built and successfully operated, steamboats were running and many of the machines in use today were doing excellent service, all designed and invented by men with no theoretical knowledge to speak of, and many with nothing but hard experience to guide them. Aeroplanes and internal combustion engines and steam turbines are amongst the few new products in the mechanical field, and these have profited by the best scientific knowledge available.

Technical training then, is rather a result of mechanical invention than a cause of it, although there is no question that since the technical principles were understood, mechanical advances have been greatly accelerated. Take, for instance, the locomotive, the first one of which was built after 1800; "Puffing Billy" was first used in 1813; George and Robert Stephenson's "Rocket" of 1829 weighed about five tons and had 56½-in. drivers, while the first Baltimore and Ohio locomotive operated the same year. Rapidly increasing traffic and technical advancement produced by 1888 locomotives with a tractive power of 30,000 pounds, while today over double that power is available and the modern engine and tender weigh 330 tons.

The first successful steamboat, the "Charlotte Dundas", of about 1800, was followed by the "Savanah" which crossed the ocean from America in 1819; the "Royal William" sailed across the Atlantic from Canada in 1833. The "Great Eastern", 692 feet long, 83 feet beam, 58 feet deep, of 28,000 tons displacement, built in 1849 (using propellers and paddle wheels) had only 8000 H.P., while in modern days the invention and development of the steam turbine has enabled boats to use 200,000 H.P., and run at 30 knots.

What Training Should The Engineer Have For Industry

From the foregoing it appears essential that no small part of the engineer's training for industry must be obtained in the shops and from men who are actually making machinery; therefore, in an engineering school, shop work must be provided for in the curriculum and it should be done in the manufacturing shop if it is to have any real value. A good knowledge of mathematics and the fundamental laws of physics is essential because they are the foundation on which the advanced work is built. The theory of machines is essential for an intelligent classification of different mechanisms and for the calculation of stresses due to inertia and to acceleration of the parts of machines. Machine design is an important subject, partly because it is essential in the design of machinery, and partly because it enables one to purchase and use machines intelligently, and in this subject one realizes very markedly the need of practical experience because no machinery can be designed without a good knowledge of shop methods and the ways in which castings, forgings, etc., are made.

The theory behind power machinery, whether of the steam,

internal combustion or water power variety, must be well understood, and as this machinery has to be carried on foundations and in buildings, a knowledge of reinforced concrete and structural work is needed. Many of the machines constructed by the mechanical engineer have a direct contact with electrical apparatus, and indeed much electrical apparatus depends very largely on the mechanical engineer for its design and construction, so that the mechanical engineer must have a fair basic knowledge of electrical work as well. In fact, he must be an all round man with a broad, general knowledge rather than too specific a knowledge of any detailed work, until he finds what branch of mechanical work he will probably follow.

Reasons For Engineering Training

But one may well ask what object there is in giving college training for men connected with the industries, when so many successful engineers in the early days had no such advantages. The answer appears to be simple. It is doubtful if a man with the ability and education of Watt and Stephenson could do much more than earn a livelihood today, aside from the unusual genius they had for invention. In the earlier days most machinery and products of various kinds were hand-made, because they were used in small quantities; but greater comfort and more luxurious living have created a greatly increased demand for many products and they have to be machine made. In this connection, the technically trained engineer has produced automobiles cheap enough to be within the reach of the artisan, safe enough to be used by people who are far from careful or intelligent, swift enough to suit the young generation and shapely enough to excite great admiration.

Only the trained engineer could make the high speed accurate lathe, the turret lathe with its high production rate, the centrifugal blower and the steam turbine, and in fact he has been the author of high speed, light and accurate machinery and processes of all kinds. He has produced boilers and turbines to run boats at unusually high speeds, has supplied the engines that make the aeroplane possible, and has supplied a demand impossible and unnecessary 150 years ago, but without these modern developments our existence at the present time would be more less happy. The early workers started us on the right road and the trained engineer of modern times built well upon his work.

Applications of the Oxy-Acetylene Flame

Adapted from an Address delivered before the Engineering Society of the University of Toronto on January 8, 1940, by W. A. Duncan, Manager, Process Service, Dominion Oxygen Company, Limited, Toronto

Oxy-acetylene welding and cutting are no longer an innovation in modern industry, but are well-tried and well-proven applications of the oxy-acetylene process. Now that the oxy-acetylene process has grown in the number of its applications to such size, a complete review of its uses must give way in this article to a general review of its major applications, with particular emphasis on the newer developments.

Maintenance and Repair

The oldest and best-known uses of oxy-acetylene welding and cutting are in the maintenance and repair field. These uses, while being of fairly common knowledge to the average engineer, are still of great interest since the problem of "keeping the wheels of industry moving" is one that will always be most important to engineers in industry.

Due to the availibility of oxy-acetylene welding and cutting apparatus, separately or in combination units, their ready portability, and the fact that practically all of the commercially used metals can be cut or welded by them, the oxy-acetylene process is particularly applicable in almost every industry that requires a certain amount of maintenance and repair of equipment.

Oxy-acetylene fusion welding is used for joining practically all commercial metals, such as cast iron, semi-steel, wrought iron, plain carbon steel, cast steel, alloy steel, stainless steel, copper, aluminum, nickel, Monel metal and lead.

Bronze-welding, too, is a particularly efficient method of producing strong joints in metals having melting points higher than that of the bronze rod being used. The base metal is not actually fused but a joint of high strength is produced through the formation of a strong bond between the bronze weld metal and the base metal. Bronze-welding is widely used for joining semi-steel, malleable iron, wrought iron, galvanized iron, carbon steels, cast steels, copper, nickel, and Monel metal. Repair of broken cast iron sections by this process is now everyday practice.

Bronze-surfacing, by which worn surfaces are built-up with

bronze-welding rod is another widely used application of the process in maintenance work.

Oxy-acetylene cutting is also of importance since it is generally used in this field for the rapid cutting to size of plate, angle iron, and sheet metal to assist in accomplishing quick emergency repairs which might otherwise require casting or machining delays; and it is also important for demolition and scrapping operations.

The use of hard-facing is of great assistance in the building-up of equipment parts subject to extreme wear or abrasive action. By depositing a coating of hard-facing alloys on the wearing surfaces of these parts, the wear or abrasion is resisted.

Production Applications

In addition to the many applications of oxy-acetylene welding and cutting in the repair of machinery in modern industry, the processes are used to an ever-increasing extent in regular production work. Typical examples of this use of oxy-acetylene welding are as follows.

Cooking utensils from sheet steel have such parts as spouts and handles, joined by oxy-acetylene welding prior to vitreous enameling. Aluminum utensile also are welded by this process. Steel furniture of all kinds, such as desks, beds, and chairs, are made from light-wall tubing and sheet steel, fabricated by oxy-acetylene welding. In the aircraft industry welding is used extensively for the tubular construction of fuselages, landing gears, and engine supports.

Steel tanks and pressure vessels of all kinds may be fabricated by oxy-acetylene welding. Also innumerable steel frames, jigs and fixtures, consisting of light structural shapes may also be joined together by this process. Oxy-acetylene welding of standard steel pipe is now an accepted method of fabrication and is rapidly replacing the use of screwed fittings. The pipe joint welded by the oxy-acetylene process is strong, leakproof, and economical to make.

Mechanical Welding

Continuous tubing is fabricated in automatic machines, using multi-flame oxy-acetylene welding blowpipes to make the longitudinal seams. In installations of this kind, multi-flame heads having as many as 35 to 40 flames are used.

For operations of this type, increases of as much as 500 per

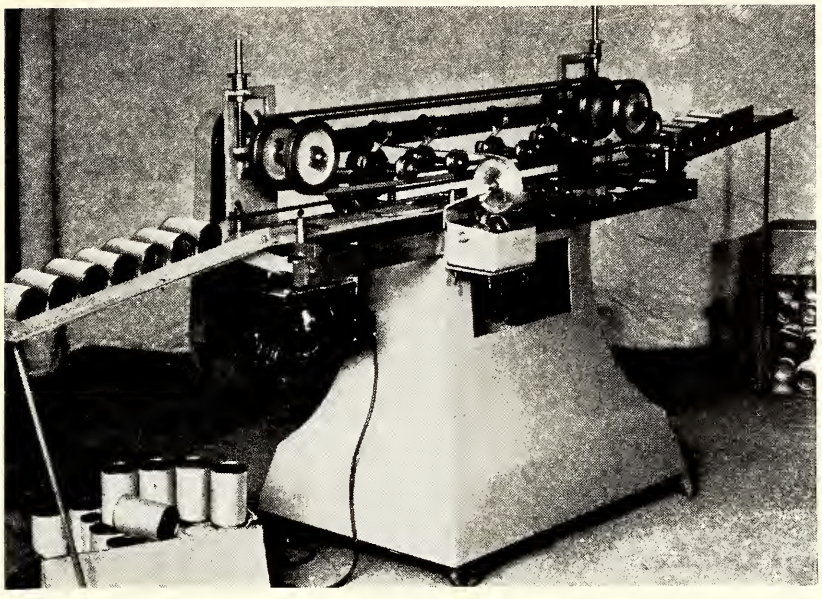
cent in the speed of welding have been accomplished in the last few years. For example, with 20-gauge material it is now possible to weld continuous tubing at a rate of 100 ft. per min., whereas a few years ago a speed of 15 ft. per min. was considered much better than average.

Latest developments also seem to indicate a definite trend towards mechanization in that field of mechanical welding wherein welding rod or added weld metal is required. This is equally true with respect to both ferrous and non-ferrous metals. Among such developments, now either in commercial use or nearing commercial introduction, is the welding of steel containers which are made up of halves joined with a single circumferential weld. The mechanical welding of aluminum beer barrels of a similar design also appears to be very near to commercial utilization.

Present indications also seem to reveal a very broad field for application of mechanical bronze-welding, using the oxy-acetylene flame in conjunction with vapor flux. The use of a liquid vapor fluxing device replaces the usual powdered or granulated flux. A special dispenser introduces the vapor flux into the acetylene gas stream, supplying the blowpipe. The welding flame then contains sufficient quantity of this vapor flux to overcome the necessity of introducing any additional flux with the rod in the conventional manner. This principle is applicable not only to steel, but also to non-ferrous metals such as Everdur and copper, and to copper- and Everdur-clad materials, and has greatly speeded up production bronze-welding. Bronze-welding speeds range from 6 ft. per min. on 20-gauge material to 3 ft. per min. on 11-gauge material have been obtained. Material as thin as 28-gauge has been joined successfully by oxy-acetylene mechanical welding at speeds of better than 10 ft. per min.

Steel Conditioning

"Steel Conditioning" includes processes that employ the same fundamental principle as that of oxy-acetylene cutting in which a jet of oxygen is directed upon a preheated spot causing the metal to oxidize and melt in the form of molten slag. The objectives of steel conditioning are different, however. While in oxy-acetylene cutting the purpose is to sever completely a section of steel, in steel conditioning only a portion of the surface metal is removed. As to techniques, too, in standard oxy-acetylene cutting operations, the nozzle is held at approximately 90 deg. to the plate. In steel



conditioning, special techniques are used with special nozzles held at approximately 30 deg. to the plate being cut, the oxygen orifices being considerably larger than that in the cutting blowpipe nozzle.

By steel conditioning, or flame-conditioning, therefore, an accurate strip or groove can be cut from the surface of steel plate, steel billets or other sections. The width, depth, and general contour of these strips or grooves can be varied by changing the angle of the blowpipe to the plate, varying the speed of travel of the blowpipe, controlling of the oxygen pressure used, and by the particular design of the nozzle itself. With so many controllable factors it is possible to obtain a wide variety of different types of cuts for various applications.

Deseaming

The most common application of this steel conditioning principle is in the deseaming of steel billets in steel plants. Steel billets, after being rolled from ingots or blooms, are carefully inspected and surface defects are removed prior to further rolling. This was formerly done by a pneumatic chipping hammer, but can now be accomplished quicker and more economically with the deseaming blowpipe. The principle of the process is based on the fact that if a nozzle designed to deliver a relatively large jet of oxygen at low velocity is properly manipulated, a strip or section of the surface metal can be removed.

Gouging

A similar application is the gouging [illegible]ess, which employs a special gouging nozzle. This process is to metalworking what the carpenter's chisel is to woodworking. In spite of the short time that gouging has been tried in the field, it has already proven an inexpensive means for performing in a matter of minutes a wide variety of operations formerly requiring many hours of tedious chipping, grinding, and planing. Originally, gouging was developed for removing metal from the underside of welds, for removing weld defects revealed by visual or X-ray inspection, and for removing temporary tack-welds. The immediate success of the gouging blowpipe for this type of work soon led to its use for a variety of maintenance operations, and, more recently, for the preparation of plate edges for welding.

Descaling

Another relatively new process is flame-descaling, which is used in the steel industry for the removal of the scale from blooms, billets, slabs, forgings, and steel castings by means of specially-designed oxy-acetylene heating heads of from 4 in. to 12 in. in width. The process is based on the principle that when quick, high-temperature heat is applied to the scale (or oxide skin) on a piece of cold metal, the scale expands and breaks away from the base metal because of a differential expansion between the scale and the steel. Descaling has a number of advantages over other cleaning methods such as pickling, sandblasting, and chipping.

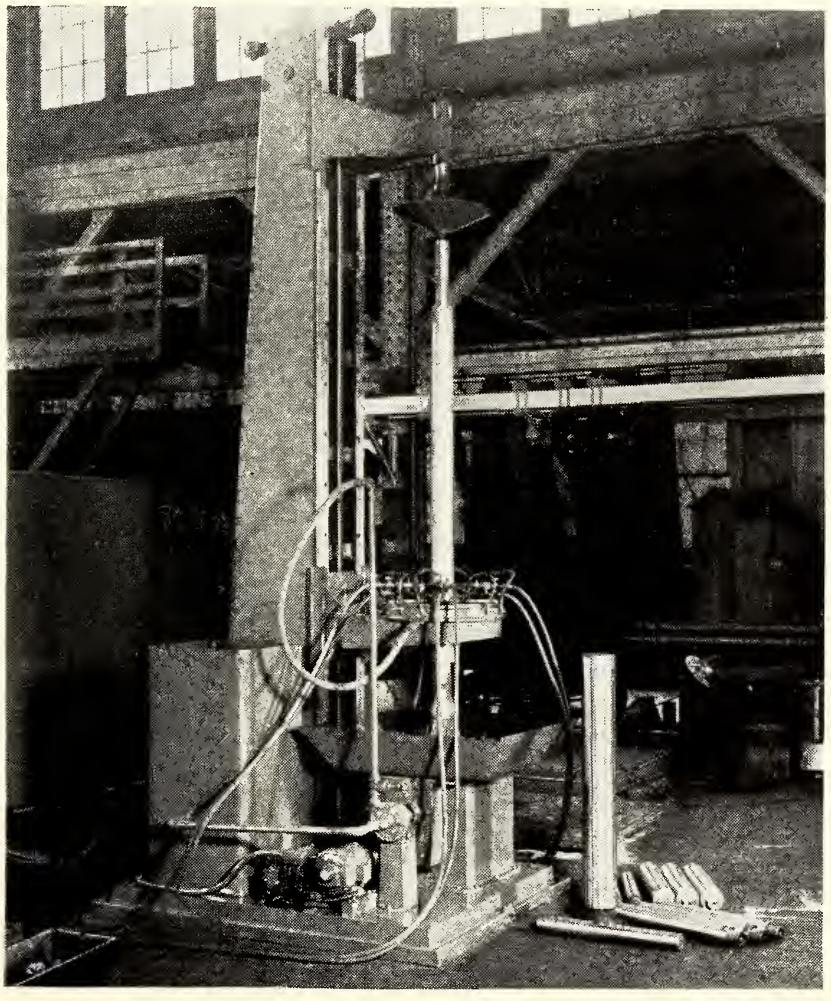
In addition to the use of the descaling blowpipe for descaling work in a steel mill itself, this apparatus is finding wide application in general fabricating shops for the removal of scale from steel plate prior to painting. Besides actually removing the scale, the blowpipe has a dehydrating action which prepares the surface for painting by the complete removal of all occluded moisture that may be present. This process finds application in the preparation of bridges, large turbines, and steel structures of all kinds, which are to be prepared for painting.

Flame-Treating

Another comparatively new application of the oxy-acetylene process is the localized heat-treatment of steel and cast iron in an application called flame-hardening. By this process quench-hardenable steels can be surface-hardened by rapid heating with the oxy-acetylene blowpipe, usually equipped with special multi-

flame heads, follow[illegible] water or air quench. This process is very flexible in that [illegible]ost any desired contour and depth of hardened case may be obtained. The process is particularly adaptable to large articles where furance hardening or other case-hardening methods, such as carburizing or nitriding, are difficult or impractical. Many hardening problems can be solved by flame-hardening which could not previously be handled by any other method. Distortion presents no problem since the core of the metal is but slightly heated, and the surface contour is preserved. Flame-hardening has already found ready acceptance in the treatment of such parts as gears, shafts, rolls, rail ends, and automotive valve stems.

Flame-softening, as the name implies, provides a rapid means for removing the undesirable hardness along the cut edges of the low-alloy, high-strength structural steels. Multi-flame heating heads are used. Flame-softening has immediate application in the more economical fabrication of structural plates for railroad



and gusset plates and web plates used in bridge and building construction.

Flame-strengthening is a process similar to flame-hardening with the exception that the treatment is given to highly-stressed parts locally in the regions of excessive concentration of stress to impart strength to them rather than to produce a hard wearing surface. Parts subject to severe stress, whose ultimate failure is the result of surface fatigue cracks, may be materially strengthened by the raising of the tensile strength of the affected surface.

Machine-Cutting

No review of the applications of the oxy-acetylene process would be complete without reference to automatic oxy-acetylene cutting. Most modern industries, which fabricate their products from steel plate, are equipped with one or more portable or stationary electrically-driven, oxy-acetylene cutting machines. While the small, portable type of cutting machines are usually used in the cutting or bevelling of steel plate in a straight line or in circles, the larger shape-cutting machines, or machines which are sometime referred to as "Profiling Machines" permit the rapid reproduction of any intricate shape on steel plate from a drawing or templet. For repetitive work a templet is usually used but for individual jobs these may be traced direct from a blue-print.

Further economy can be obtained in the use of automatic cutting for repetitive jobs by a process called stack-cutting. This consists of the use of the cutting machine for the cutting of a stack of two or three to possibly thirty or forty plates, firmly clamped together, so that the cut penetrates through all the plates at one time. By this process, for example, it is possible to cut plate as thin as 1/16 in. piled into a stack, 2 in. to 3 in. in thickness. This process is already being used in industrial plants to replace mechanical processes, such as production stamping.

Conclusion

The following points may be drawn from the thoughts which have been brought out in this brief survey. First, the oxy-acetylene process is well-established and in use today in almost every industry. Second, the newer applications of the process are becoming comparable in importance with the basic uses of oxy-acetylene welding and cutting themselves. Third, the oxy-acetylene process is in a stage of continual development, which will result in its still greater growth and importance to industry.

Character and Effect of Wind Action On Buildings

BY S. J. SIMONS

First Prize Paper delivered at the joint meeting of the Engineering Institute of Canada, Toronto Branch, and the Engineering Society of the University of Toronto on January 18, 1940

The erratic nature of wind action on a building creates numerous problems in a study of wind pressures and velocities. A very thorough and intensive study of the wind action on the Empire State building has been in progress for several years. One of the experiments which was carried out in the course of the study was to allow a balloon, attached to the highest point of the mast by a thread several hundred feet long to drift where it might by the action of the wind. It was found that the balloon did not move horizontally from the wind, as would be expected, but eddied in the lee side of the building and travelled vertically upwards the full length of the thread and returned. After the thread was severed it remained in the lee of the building for fifteen minutes.

The drift of fog and snow flakes was also studied at certain floors in the building in order to determine the direction and approximate velocity of air currents. A compilation and study of the results of such tests showed that the distribution of wind pressure on a tall building is rather complicated and irregular, the air currents having been broken up by surrounding structures and the building itself.

Therefore, the wind pressure that a building may withstand is hard to surmise. There are, however, several factors upon which wind pressure does depend, such as, the shape, area, exposure and probably the most important, the maximum wind velocity that is likely to occur during the life of a building.

The most valuable and complete source of information on wind velocities are the data published by the United States Weather Bureau at Washington. They publish the maximum average velocity occurring over a five-minute period. The velocity, duration and period of gusts are important. Any specifications for wind forces must be made to agree with them.

It has been established that the gust velocity is, on an average, twenty-seven per cent in excess of the maximum average velocity;

but cases have been noted where the gust velocity was seventy-four per cent in excess.

If and when these gusts occur at regular periods the building is affected dynamically as well as statically, and the extent to which this dynamic effect is resisted depends upon the rigidity and inertia of the structure. Thus, in a tall building with the walls and masonry increasing the rigidity and inertia, the effect of gusts is decreased considerably. However it would not be considered advisable to neglect this dynamic effect if the building was to be erected in a hurricane or tornado zone. The building must be designed to withstand the maximum wind stress that will, or is likely to, occur during its lifetime.

The interpretation of velocity in terms of pressure is to be considered next. Newton was the first to investigate the flow of air against an extended plane surface at right angles to the direction of the wind and he found that the pressure varied with the square of the velocity. It is upon Newton's relation that all subsequent research has been based. More recently the results of wind tunnel tests on a model of the Empire State building have shown the relation $P = 0.0038V^2$ to be suitable for use in the design of tall buildings.

The velocity and, resultantly, the pressure increases with height but despite numerous attempts to establish a relation between velocity and height, it has become generally accepted that it is impossible to derive a law which might be followed. The turbulence caused by ground conditions in a modern city render it out of question to consider that velocity-height relation based on any of the formulae which have been derived. The increase in velocity does not continue indefinitely but only until the gradient wind is reached, that is, until such a height is reached that the wind is free from surface disturbances.

The area of surface exposed to the wind bears a rather extraordinary relationship to the pressure produced. Due to the fact that the wind comes in gusts, the average pressure is less on a large area than it is on a small area. This fact has been proven beyond doubt by various studies and experiments. Two pressure boards were set up on the Firth of Forth bridge in Scotland. One of these was rectangular and 120 square feet in area while the other was circular and 1.5 square feet in area. Over a period of six years the maximum pressure registered on the small plate was 40 pounds per square foot and during the

same time the large board showed a pressure of 27 pounds per square foot.

Another notable example of pressure to area relationship is brought forward by studies made by Julius Baier. Mr. Baier's method of attack was very ingenious. He calculated the equivalent uniform pressures which must have existed over several structures during the St. Louis tornado of 1896 from their moments of stability. The results he obtained substantiate the pressure-area effect remarkably well and establish beyond doubt that the unit pressure in storms decreases rapidly as the area increases.

The location of a building with respect to nearby structures is important. Neighbouring buildings exert a considerable influence on the wind pressure. As might be expected, and as has been proven by tests, the shielding effect of nearby buildings on any structure causes a decrease in the resultant pressure on the windward face and suction on the leeward face. The height shielded is slightly less than the height of the shielding structure.

One of the interesting effects of wind action is the torsional or twisting force of the wind on the building. This may be due to one or more of several reasons. First, consider the wind blowing at right angles to the face of the building. A blanket of retarded air forms a buffer which diminishes the effect of an even wind. If the wind strikes the building at an angle the protective layer can not be formed so readily and a drag is produced along the length of the wall. This causes a negative pressure to build up at the leeward corner of the windward side resulting in a torsional action on the tower about its vertical axis.

Unsymmetrical stress distribution may be produced by the shielding effect of nearby buildings. In this case, different torsional moments arise at the various floors which may require special investigation. It has been shown that the wind pressure is not uniformly distributed across each story as has been assumed in the design of tall towers but the centre of pressure is eccentric to the vertical axis. Although the wind may be uniformly distributed across the face of the tower if the tower is unsymmetrical in plan about an axis parallel to the direction of the wind, there is a resulting twist due to the eccentricity of the center of rotation of the tower with respect to the center of pressure of the wind. Such situations as these warrant special

consideration in the analysis of a tall frame if the possibility of their occurrence is imminent.

Besides the torsional or twisting action there is the normal deflection of the building under transverse wind load. The effect of the wind in this case causes vibration of the building. The control of such vibration within reasonable limits is one of the more important requisites of wind design. A building in which deflection is not controlled satisfactorily will be considered unsafe by its tenants, even though it is structurally sound. It appears that apartment dwellers are particularly susceptible to this effect, probably due to the fact that when a person is alone at night, with a wind howling outside, the imagination works overtime. Such things as swaying chandeliers and slight, but perceptible, movement cause fear and lack of confidence in the safeness of the building. On the other hand, office workers are not nearly so likely to notice any disturbances.

This deflection must also be limited to protect the non-skeleton parts of the building and the manner in which this is done is interesting. The difficulty is that it is impossible to forecast the extent to which the architectural clothing of a building is going to subdue the deflection. To circumvent this, a relation is taken for design purposes between the maximum deflection at the top of the frame, when it is subjected to the maximum wind load and the height. It is assumed that the steel frame absorbs the entire wind load. Although this ratio is not the actual deflection that will arise in the finished building it is some multiple of it and serves as a valuable means of guidance to the designer. Experience plays a large part in the choice of the ratio used but, generally speaking, in very high towers subjected to an assumed triangular loading, a deflection ratio of two-one-thousandths has proven satisfactory. For buildings of moderate height, that is from twenty to twenty-five stories in height, two or three times this value is required.

Thus, despite the fact the effect of wind action on a building is unpredictable, there are factors, which have been pointed out, which present a means of guidance to the engineer in the design of wind bracing in buildings.

The Development of the Flotation Process

Written for Transactions and Year Book by Van H. Smith, Sr.

The measure of the progress of the development of any country can usually be based upon the extent to which they make use of minerals or metals and it therefore follows that a country rich in mineral resources will naturally show a greater rate of progress than another country lacking in these essentials. There is always the exception to any general statement of this kind, and we may point out that Great Britain is seemingly such an exception, but also wish to call attention to the fact that Britain does possess vast resources in the nature of coal, and coal is equally important because of its necessity in smelting or refining operations.

Studying the history of Canada and the United Staates, we note several periods of great prosperity and expansion occurring approximately at the same time and following the discovery of any new gold fields or mineral deposits.

It is the intention to show in this article that progress in the metallurgical art has assisted in making the most of these mineral resources, and more particularly to emphasize the part that has been played by the development of the flotation process in making possible such progress.

The art of winning metals from ores was not unknown to the people of ancient times because we find in ancient ruins various articles of copper or of iron or of lead; we have also found the sites from which the ore was originally taken and also the places where they were crudely smelted. In most instances, we have been forced to conclude that the ancient mine ores were of comparatively pure mineral and, since deposits of such purity do not occur too frequently, it is only natural that there should not have been any greater development in metallurgy. As these rather pure deposits were worked out, it became necessary to win the mineral from lower grade material and this in turn necessitated some form of concentration between the mining operation and the smelting. Since one metal—gold—has been recovered by a method of gravity concentration for centuries, it is only natural that when it became necessary to concentrate ores of base metals that some similar method of gravity concentration be developed for the purpose. Just as the ancients were able to catch gold in the fleece, so in time was developed the system of riffles to which was added handjigs and later on mechanical machinery.

The minerals of the base metals, however, do not possess the high specific gravity of gold and do not yield a similar high recovery as does gold. This is because the minerals of the base metals—being usually sulphides—are rather brittle and fracture readily with the formation of slimes, and slime mineral has always been recovered with great difficulty and as such has been the subject of much experimentation for the purpose of increasing the recovery.

Turning now to the development of Canadian mineral resources, we find that with the completion of the C.P.R. and other transcontinental railways in the United States, a vast area was opened and it was only natural that mineral deposits should be discovered. As in olden times those mineral deposits of high purity were first successfully exploited, and later on came the development of the less pure deposits and the problems connected with the economic recovery of the metal therefrom.

Prior to the last world war, ores could either be smelted direct or could be concentrated by the then existing machinery consisting of jigs for the coarser mineral, tables for sands and Vanners or riffled tables or canvas tables used for the recovery of slime mineral. Seldom did the overall recovery of mineral from an ore so concentrated ever reach more than 60 or 65%.

With the previously unheard of great demand for metals that occurred at the time of the last world war, it was very evident that either many more new mines must be opened up or the existing mines be so worked as to produce a greater output of minerals.

The first process brought to the attention of the mining industry that gave promise af yielding higher recoveries of mineral was one which was developed in its early stages in Australia in the treatment of the lead-zinc ores of the Broken Hill district. There it had been found that slime pulps which had heretofore been wasted could be concentrated because of the apparent affinity that organic oils had for the mineral sulphide particles. By adding one or two per cent of oil relative to the mineral content, keeping the pulp in motion, there was a gradual agglomeration of the oiled sulphide particles—thus they built up slowly as does a snow ball rolling down hill gain size, and this agglomeration being of mineral (heavier than the slime gangue particles) could be separated the one from the other—the sulphide from gangue—by subjecting the pulp to classification in a gentle

upward rising column of water. The sulphide particles, being heavier, would sink in the rising column of water, whereas the gangue slime particles would be washed over to waste. This procedure was known as the Cattermole process and it was while investigating the various phenomena connected with this process that froth flotation of sulphide mineral was first effected. It was only natural that experimentors desired to know the effect of various degrees of agitation upon the size of the agglomerated granule, also the effect of varying quantity and quality of the oil used, and it was quickly found that when the degree of agitation was increased from a very slow rolling motion to that of a violent aeration that instead of granules of sulphide mineral being formed, a froth was formed carrying the bulk of the sulphide mineral. It was next found that increasing the quantity of oil added to the bulk made but little difference but there was a marked improvement in total sulphide recovery in froth when the quantity of oil was decreased. Here then, in a very few words, is told how the flotation process was developed from the then existing Cattermole process.

At about this same time there had been discovered in Canada large deposits of mineral which required concentration prior to smelting and it was also during this period that the great porphyry copper deposits of the South Western United States were being first explored. As stated before, however, only about 60% of the mineral or less was being recovered from such ore when there came the sudden demand for increased metal production due to world war conditions occurring from 1914-18.

It is only natural that mine operators and metallurgists should investigate this new process which was being talked of so highly in Australia and the two or three pilot plants which had been erected in America in the period just preceding the war, were quickly expanded to take care of full scale operations. Recoveries in concentrates which had formerly been only 60% now reached 90%, and even higher, and the concentrated product was excellent quality and led in many instances to a reduction in smelting operations due to the treatment of a more concentrated product. Ores which were not considered economic were brought into the field of favourable exploitation and among these may briefly be mentioned those from the Sullivan Mine in British Columbia, the copper deposits in Copper Mountain, B.C., and increased scale of operation at such places as Sudbury and Britannia Beach.

While it is true flotation in the early stages recovered the mineral in one bulk concentrate, yet it was not long before it was possible to make separations as between lead sulphide and zinc sulphide or to separate copper sulphide from iron sulphide.

From the foregoing one can see that increased use of the flotation process brought into payable ore reserves vast tonnages heretofore considered uneconomical. There quickly appeared two designations as far as flotation work was concerned, one being selective flotation which referred to the recovery of mineral from gangue, and then later the term "preferential flotation" whereby mineral was not only separated from the gangue but from other sulphide mineral as well. Under this latter heading our modern day plants employing this process in Canada are those such as Noranda, Aldermac, Copper Cliff, Flin Flon, Chapman Camp, Copper Mountain and Britannia Beach.

It has been found that the modern flotation concentrate is cheaper to build, is more simple, occupies less space and less labor to run than the old type of concentrate employing jigs, tables and vanners.

Recoveries of the valuable mineral have been increased through the use of the flotation process to an average of well over 90%, as compared with an average of around 60% in the old type of plant. The ability to discard unwanted mineral and gangue from the desired concentrate has enabled smelter operators to either reduce the size of their plans, as compared with those in former days, or to put through greatly increased tonnage compared with formerly.

Although one of the most easily floated of minerals or metals happens to be gold, little connection existed between the process for winning gold from ores and flotation concentration until it was fully realized that in many instances the gold in our Canadian ores existed in intimate association with the sulphides of such ore and that when a gold ore proved refractory to ordinary treatment, it was usually because of this intimate association.

The tendency in the milling of gold ores had been to grind the entire ore finer and finer and depend upon satisfactory dissolution of the gold from the pulp by cyanide solution. It was realized that the ore containing gold must be ground sufficiently fine to free the gold for the dissolution by the cyanide. Where the gangue material was quartz and the gold closely associated with pyrite and if, for instance, the pyrite only amounted to

5 or 10 per cent of the entire ore, then it was necessary to grind 90 per cent of this least valuable, but yet hard portion of the ore in order to effect the necessary communition of the sulphide particles. As the value of the flotation process became more widely known, it was quickly realized that oftentimes it was possible to separate the gold-bearing sulphide from the quartz at a mesh considerably coarser than that which would be required when grinding the entire pulp so that the gold would be exposed for the cyanide process. This fact then led to the introduction of flotation into the treatment of gold ores.

The first attempt at joining the two processes was made in South Africa in or about the year 1925, when the flotation plant was installed in the Johannesburg District for the purpose of segregating gold-bearing pyrite for fine grinding while allowing the less valuable, but by far the greater proportion of the ore, to be treated in the usual manner. This plan was not economic because of the fact that after segregating the sulphides it was not possible to give them the extremely fine grind required for freeing the gold particles.

No further attempt was made in that field until 1932, when renewed interest was occasioned by the successful adoption of the process in the treatment of McIntyre Porcupine ore here in Canada.

McIntyre Porcupine Gold Mines Ltd., through the efforts of that very able metallurgist—Mr. J. J. Denny—installed the first large flotation plant for the treatment of gold ores here in Canada. Due to the particular mineralization of the ore, they have been able to discard a very low grade flotation tailing to waste and thus concentrate their attention on the grinding and cyanidation of the pyritic concentrate.

Flotation next appeared in the Kirkland Lake field, where Wright Hargreaves used this as an additional process to recover telluride and any free gold that had passed through their circuit without being dissolved. It will be noted that here special treatment was given to pulp that had passed through the usual cyanide treatment; therefore the action of the process here was in the nature of a scavenging process. Shortly thereafter Lake Shore Mines installed a flotation plant, similarly for treatment of existing residue. This plant, first operating steadily, later only spasmodically, showed less promise than did that at Wright Hargreaves, and was later abandoned until a method devised

for successful treatment of the concentrates was produced. In the meanwhile such plants as Beattie in Quebec area, Pamour, Moneta and McIntyre in the Porcupine area, and various other plants through the Dominion have continued to play an important part in increasing the gold production from Canadian ores.

The very nature of the Northern climate makes it necessary that ore treatment plants be compact and simple, as compared with those which may possibly be erected in warmer climates. Flotation equipment and machines have been developed to the point where they have rather large capacities, considering the floor space required for their installation, and it is expected that flotation will be required more and more as an auxiliary process for adding additional recovery to existing cyanide plants. The development of new tools, such as the Haultain infrasizer and super panner, have made it possible for metallurgists to more accurately locate where existing losses occur in present day schemes of treatment. Here in Canada, nearly always we find when studying a plant residue that has been given the usual cyanide treatment, that the gangue or quartz particles of the residue vary in gold content more or less according to the size of the product. We find also that there is seemingly a gold unit value for the sulphides, and this holds pretty well true irrespective of the coarser sizes, and that this unit value does not disappear until we begin the study of the very finest operations of such residues. Where such a condition exists—that is to say—where the gangue, after cyanide treatment, is practically valueless and yet the sulphides still contain sufficient gold to be won economically, the mill man or metallurgist can well investigate the advantages which may occur to the plant in added recovery by the introduction of flotation after the completion of the usual cyanide treatment.

Just as the flotation process has assisted in making possible greater development in gold ore and base metal treatment, present research indicates that it will also assist in making more economical, treatment of non-sulphide mineral deposits, such as iron ores, limestone, fluorspar and various others.

Constant research, coupled with greater knowledge of the reagents and mechanical problems involved in preparing ores for treatment, has already accomplished today, some things considered highly improbable a decade ago. Still further development may be expected in the years to come.

Burn Cut versus Diamond Cut

BY G. D. THOMAS

Adapted from Paper entered in the Canadian Mining Journal Student Competition, 1940

Development work consists in opening up an ore body or ore bodies so that they may be sampled or appraised as well as prepared for extraction. Any change in the technique which increases the efficiency of these early operations is of first importance to the management and ultimately to the whole mining industry. When a blasting system requires two men to return to a freshly blasted face the aims of dust control are defeated. Further, such a system of blasting introduces the dangers of delayed fire, of toxic poisoning or the like, which hazards are not present when the entire blasting cycle is carried out at the one time. Permitting the blasting cycle to be completed at one time the burn cut offers a simpler, cheaper round which is much more adaptable to changes in direction. Subsequent remarks will deal with a comparison of the diamond cut with the burn cut as applied to lateral development. Tried by my partner and myself, while burn cuts were being experimented with at the Hollinger, the burn cut described in this paper does not represent Hollinger practice.

Diamond Cut

The blasting action of the diamond cut is the tensile shearing of an entire wedge of rock out of the face, and the resulting fragments are thrown well back from the face with considerable force.

The lining up of the diamond cut is difficult due to the restrictions imposed by drift dimensions, and on starting holes the starter bit tends to skid along the face. When using the diamond cut the direction of the drift may be changed but a small amount each round which may necessitate considerable slashing on an irregular vein. Due to the heavy burden on the cut holes they not infrequently fail to completely remove the intended rock wedge, which necessitates the blasting of the cut separate to the round. This is a practice that is objectionable for several reasons. From the standpoint of safety the men are exposed to fume hazards and, due to extremely poor visibility and haste, are liable to miss loose ground which in falling may miss them but detonate the explosive which they are handling. This same poor visibility

may be responsible for costly mistakes in the lighting of the fuses. From the standpoint of the miner's health, exposure to dust at any time is to be avoided. Accidents are extremely costly not only to the company, but also to the men. The health and safety of the men is the first consideration.

The explosive used and recommended for the diamond cut blasting is the dense, quick firing C.I.L. Polar Forcite Gelatin, forty per cent. The amount of explosive required per cut completely blasted is on an average not less than twenty-five pounds. It is not uncommon to use as much as thirty-five pounds of this explosive to pull one cut. It is generally conceded that, for the maximum efficiency using the diamond cut, skilled miners are essential.

It is desirous to obtain some type of cut which may be blasted with a fair degree of certainty at the same time as the round.

Burn Cut

The blasting action of the burn cut pulverizes and compresses the thin, uniform strips of rock between parallel holes. The dust and a few well-fragmented pieces of rock resulting from the blast are thrown back only a few feet from the face.

The number of holes used in the drilling of the burn cut varies considerably. Up to August, 1939, an eleven-hole burn cut (Fig. 1) was the best we had used, and it was quite dependable in several kinds of ground.

Eleven holes would seem a prohibitive number of holes, but consider the number in a complete round. On an average, twenty-eight holes are used for the complete round, regardless of the number of holes used in the cut, which would seem to indicate that holes not drilled as cut holes must be drilled as helpers. The drilling of cut holes necessitates the minimum amount of moving for machine positions and the holes may be lined up very accurately. Only nine holes in the round are drilled from a staging.

The holes are drilled in the order shown (Fig. 1). Holes two, three, five, six, seven, nine, ten are thus grouped together around hole number six. The corner holes, eight and eleven, are sometimes drilled half an inch lower than holes nine and ten. Only five holes are blasted. Hole number six is blasted first, compressing the rock into holes two, three, five seven, nine and ten. Hole one is blasted next, then hole four. Holes eight and eleven are next blasted depending on which is the heavier.

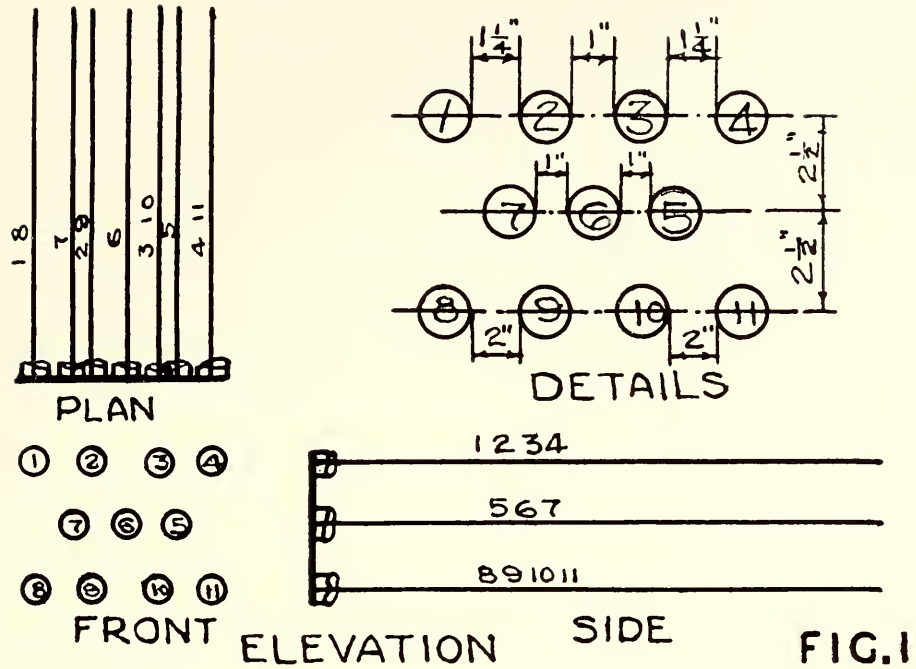


FIG. 1

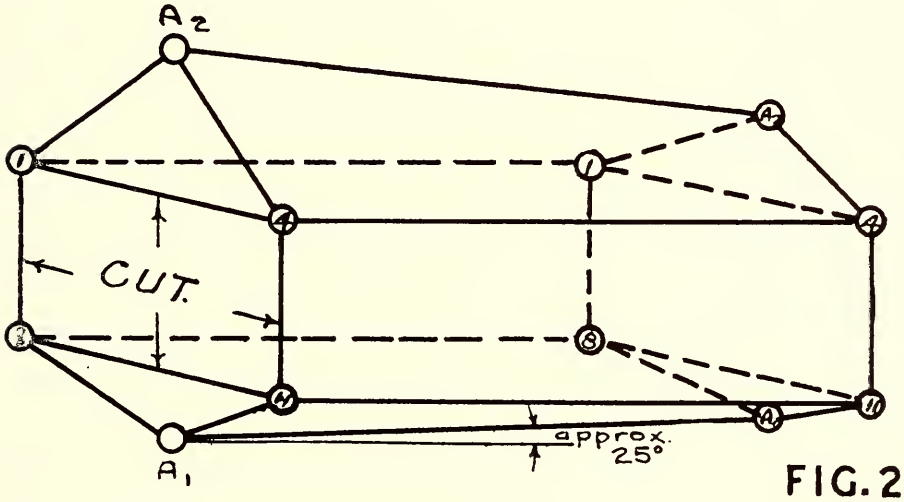


FIG. 2

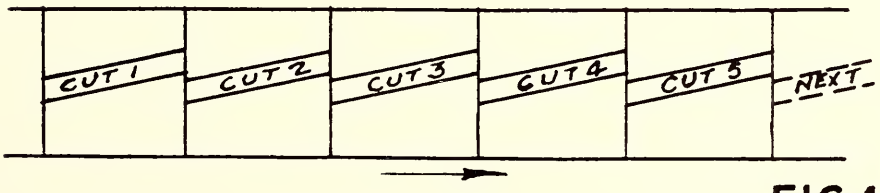


FIG. 4

The bulky explosive, C.I.L. stopeite fifty-five per cent, number six detonating caps, one-half by one-half by six inch and one-half by one-half by eight inch wooden spacers, are used for this cut. The eight inch spacers as supplied by the Hollinger are too long for this cut and a four inch length is too short; thus a six inch

spacer is used. Eight inch spacers are convenient length for blasting the square up. A nine foot length of fuse is used and the cap is placed in the first stick of powder loaded into the hole.

Hole A1 (figure 2) is bottomed just as close to the end of the cut as it may and still not be set off with cut (approximately four inches). This hole is intended to clean out the loose rock and dust in the cut. An average loading for this hole is two sticks of powder, one stick of powder with cap, alternate stick of powder and eight inch wood spacer out to face with no empty collar left. The total load is eight sticks of powder and four eight inch wooden spacers. This is the first hole to go after the cut.

Hole A2 is loaded with powder to within two feet of face, then one eight inch wooden spacer is used. The hole is loaded leaving no empty collar. This is the second hole to go after the cut.

The square up is the same from this point on as for the diamond cut except that less powder is required for the helpers with this cut.

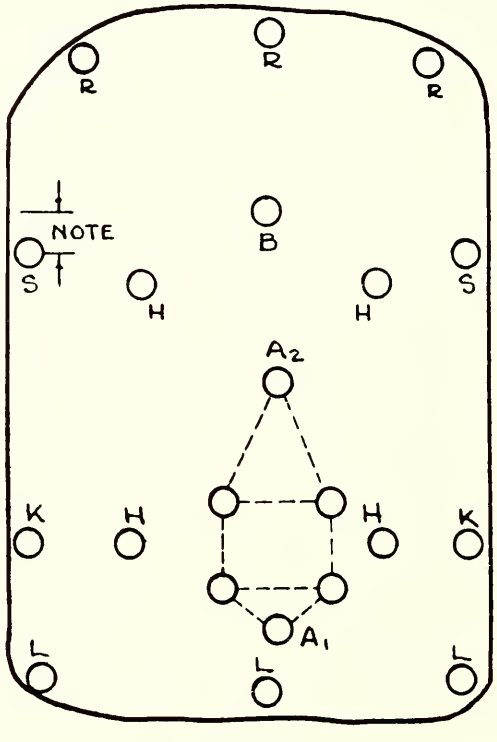


Fig. 3

Shoulder holes (S) (Fig. 3) and the two helper holes (H) above the cut are drilled from a lower arm position than that from which breast hole (B) is drilled. This is an important point for otherwise the helpers will look down too much.

There is one precaution to note in the use of spacers; they should never be used ahead of the detonating cap. Thus, in order

to use spacers from the bottom of the hole, back to the collar, the cap must be placed near the bottom of the hole. The placing of the cap in the first stick minimizes the possibility of unexploded powder in the bottom of a cut hole.

By looking the cut slightly to the left, better results are obtained from the left hand bottom helper (Fig. 3) and the bottom of each cut will be just to the left of the start of the next cut (Fig 4). The chance of drilling in the bottom of an old cut is thus obviated.

The additional holes for the complete round are four helpers (H), one breast hole (B), two shoulder holes (S), two knee holes (K), three back holes (R), three lifters (L) (Fig. 3).

The bottom of the cut has a good opening and, when the first two holes after the cut are blasted, there is plenty of room into which to break the four helpers (H) (Fig. 3).

The ground is evenly distributed over these helpers from collar to toe and spacers are used to distribute the powder over this length. The cut and helpers are drilled about four inches longer than the holes of the square up and it is seldom there is more than a two inch bootleg on the next face.

The first hole to go in the cut shoots dust back into the heading, but no muck. The other four cut holes throw back a few well fragmented pieces which are too small to muck each round and are cleaned up after several rounds. The track and pipe can be carried close to the face and headings can be started close to timber. The finished track and the cut-muck are close to the face. Thus a few plates at the face will handle all the muck from the round.

The explosive used for this type of cut is bulky fifty-five per cent C.I.L. stopeite. Fourteen pounds of this powder is ample for cut and the two auxiliary holes. The cut requiring eight pounds and the two auxiliary holes, one top and one bottom, six pounds.

This cut allows the blasting of the whole round at the one time and gives considerably more time for drilling since there is only one blasting operation. The loading of the holes is done at a face that is clear and clean and there is far less chance of a mistake being made loading, cutting fuse, or in lighting up the round. Blasting can be done at a set time, thereby eliminating the possibility of jarring down loose rock in adjacent stopes or of smoking other crews out.

A Comparison

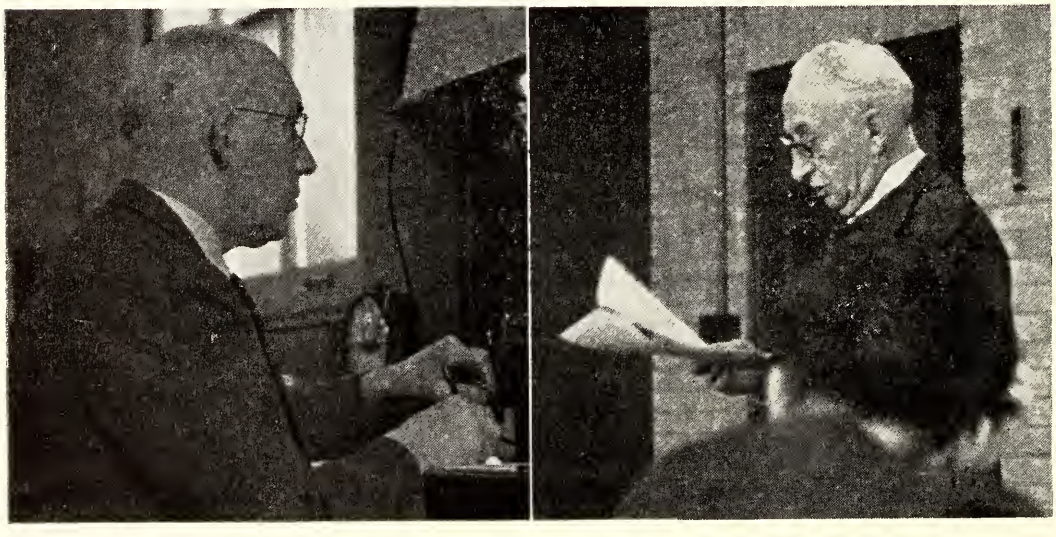
The diamond cut round requires more highly skilled and experienced miners than the burn cut round in which more holes must be drilled. However, for this round the moves are simpler, the holes can be more easily started, and there is more time for drilling since there is only one blasting operation. This type of round would be justified by the improvement to mine safety and health alone, but better advance more than justifies its use.

Explosives cost less since a smaller quantity of a cheaper powder is used for the burn out. Plates, track, rails, ties, pipe and timber can safely be close to the face with this cut but must be well back from the face with the diamond cut and even then they may be considerably damaged. The burn cut not being restricted by the width and height of the heading makes possible much sharper turns per round. This fact may considerably lessen the amount of slashing necessary, especially on an irregular vein, thereby not only cutting down the cost but speeding up the development.

When the muck is all on plates at the face, mucking is simpler, fewer plates are needed and, with the track completed right up to the muck pile, only short extension rails are required.

The advantages of the burn cut over the diamond cut as described in the above would appear to warrant the adoption of the burn cut in place of the diamond cut.

The author of this paper wishes to thank the Hollinger Consolidated Gold Mines for permission to submit this paper in the student competition of the *Canadian Mining Journal.*



The University of Toronto Link Trainer

BY PROF. T. R. LOUDON

Modern transport planes operated on scheduled time day and night can only be flown by men who are thoroughly trained in what is called "instrument flying".

The Link Trainer, which is a mechanical contrivance that imitates the motions of a plane in flight, is the modern method of teaching pilots precision instrument flying. One of the chief difficulties in learning this type of flying in the air is that a great amount of time is taken up in flying back and forth when a mistake is made in some procedure; but when a mistake is made on the Link Trainer it can be checked immediately.

Previous to the invention of this machine, it was thought that a pilot should have considerable experience in actual flying before learning "blind instrument flying". The general result of this was that unless the pilot was under some disciplined instruction or was sufficiently intelligent to realize it himself, he contracted bad habits from flying by observing familiar objects on the ground such as roads or railways; and consequently found it difficult to use his instruments or even to believe and rely on them when flying "blind". It is now well recognized that a course of instrument flying on the Link Trainer should be given to a pilot very early in his training with the result that he instinctively comes to rely on his instruments.

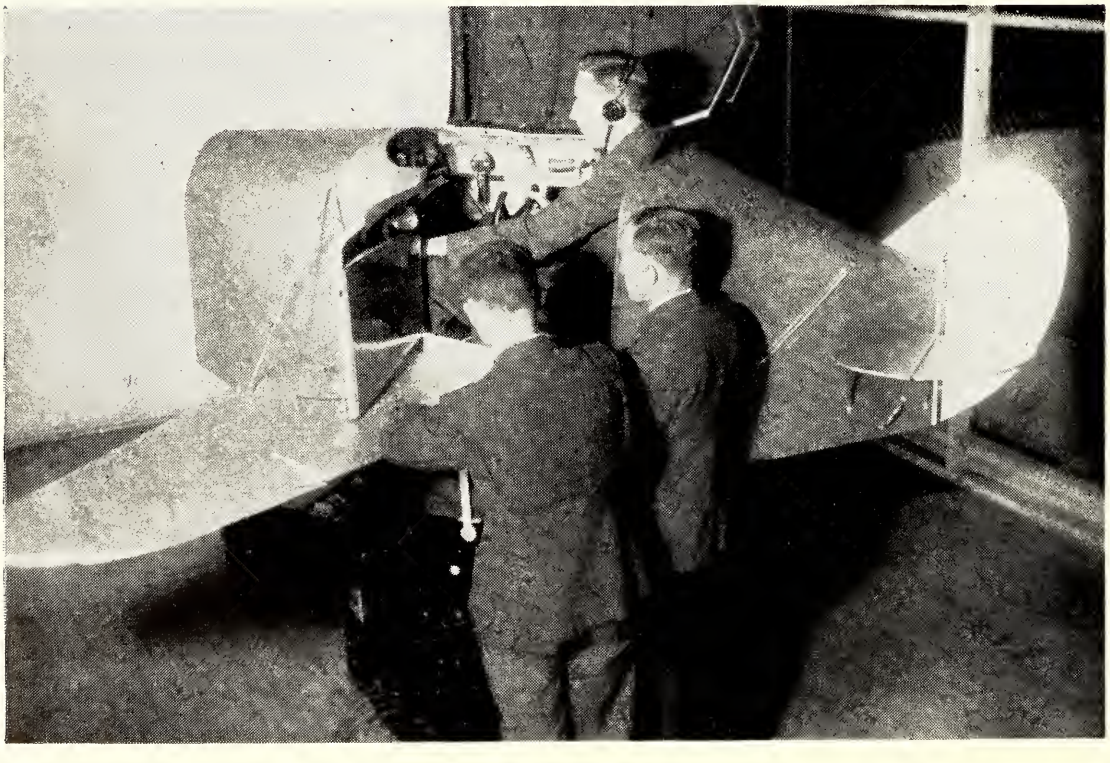
The machine itself is a beautiful piece of apparatus, the main method of operation being by means of small bellows actuated by low pressure compressed air. This gives the smooth motions of a plane in flight which might be jerky if brought about by ordinary mechanical linkages. The electrical layout is too complicated to describe in such short space; but it can be pointed out that all the Radio Beam flying procedure is imitated and the track or path of the plane relative to the earth is traced out in front of the instructor by a contrivance which is synchronized with the motions of the trainer. The instructor, who sits at a table outside the trainer, is in communication by telephone with the pilot under the hood of the plane.

A few comments on the procedure followed may be interesting. One of the methods of impressing the pilot with the necessity

of paying attention to his instruments is to tell him to glide down from say 6,000 feet at so many feet per minute. The green pilot will usually pay little attention to his relative altitude to the earth. When he goes past zero, the instructor bangs a book on the table near his microphone, making a terrible noise like a crash in the ears of the pilot. The hood is then lifted up slowly revealing a perspiring individual who thinks he has crashed the machine somehow or other.

The hood on the machine is termed the "thought eliminator". A green man left to himself when the hood is first closed down seems to have the greatest difficulty in subtracting 180 degrees from his course as shown on the compass; or indeed in carrying out even the mast elementary mental additions and subtractions —hence the name "thought eliminator" given to the hood.

The Link Trainer at the University of Toronto has been placed there through the kindness of the Department of Transport officials who have shown great interest in the proper basic training of future pilots and ground officials. Students in the Aerial Navigation course are given instruction on this machine and the Trans-Canada Airlines eastern Captain Pilots are checked over once a month. It is hoped also to make the instruction available to the general flying public at some future date.



Rehabilitation of Flooded Generators

BY D. R. B. McARTHUR

Winner of Second Prize in Student Competition held at the joint meeting of the Engineering Institute of Canada, Toronto Branch, and the Engineering Society, of the University of Toronto, on January 18th, 1940.

On several occasions during the last few years large electrical generating machinery has been flooded with ice and water. Replacement of the damaged windings on these machines represented a considerable capital outlay and thus an attempt was made to dry out and repair the original windings. This paper deals with two drying methods that were found to be highly successful.

In most cases the coils were at the operating temperature of 50°C when the machines were flooded. As the units cooled, surrounded by water, the moisture was drawn by vacuum into the innermost layers of insulation thus greatly increasing the drying problem.

Many machines not completely embedded in ice were dried by the circulating hot air method. Prior to the commencement of actual heating operations the accumulation of oil and dirt left by the flood was removed from the windings by means of a carbon tetrachloride and mineral spirits spray. The saturated caps and taping were removed from the coil ends to facilitate the egress of moisture from the windings.

A number of copper-constantin thermocouples were placed at various points on the iron, coil ends and coils of the machine for the purpose of obtaining representative temperatures at different portions of the unit. The ends of the thermocouples were brought out to a terminal board mounted on the side of the housing.

The generator, excluding the bearings, was enclosed in a rectangular insul board house. The two by four inch studding supported the insul board externally, thus preventing unnecessary disturbances in the air flow inside the house.

Hot air was introduced into the housing about four feet above the floor level through a sheet iron duct thirty-two inches square. Cold air was blown through a heater into the house by means of a 4,000 c.f.m. centrifugal fan. The quantity of air entering the house and thus the temperature and static pressure inside the house were adjusted by means of sliding covers on the vents.

Hourly temperature records for each thermocouple were obtained using a potentiometer graduated directly in degrees centigrade. The temperature of the hot air entering the housing was approximately eighty to ninety degrees centigrade.

Temporary wires, connected to the field, the collector rings, and to the open ends of the armature coils, were brought out to the terminal boards. The value of insulation to ground resistance of each was obtained daily using a 1,000 volt "megger" instrument. These readings were indicative of the dryness of the machine insofar as ground insulation was concerned, but gave no indication whatsoever of the condition of the insulation between turns. Thus, in the early stages of drying, higher than the required minimum values of the resistance of the armature insulation to ground were disregarded as definite proof of dryness.

After several days of heating the stationary machine in this manner, it was found that the heat losses through the housing were too great to maintain high average temperature in the winding. To overcome this difficulty, the upper half and roof of the house were covered with a four-inch thickness of rock wool, held in place by means of wire netting stretched between the studding. The lower half of the structure was wrapped with sheets of corrugated asbestos paper tacked to the outside of the studding. This provided a four-inch air space between the insul board and asbestos paper. By creating such an air space cold air convection currents were cut to a minimum, and a blanket of still air, having better heat insulation properties, was formed. The inlet air temperature was raised to 100-120 degrees, thus increasing the average temperature in the machine to about 80-85 degrees centigrade.

To obtain more definite information concerning the condition of the unit, wet and dry thermocouples were installed in both the inlet and outlet air passages. From these temperature readings the relative humidity or amount of moisture in the inlet and outlet air was calculated. However, these results were unreliable due to the large difference in temperature between the inlet and outlet air, and also because the wet thermocouple was located in a high velocity air stream. For these reasons, the dew point method was used. When the dew points of both ingoing and outgoing air were known, the number of grains of moisture per pound of air were computed from a psychrometric

curve. The difference in moisture content between ingoing and outgoing air gave an indication of the amount of moisture being removed from the windings.

When the field coils were deemed dry and firm enough to withstand the stresses caused by rotation, the machine was allowed to run at slow speeds. The gate leakage into the turbine provided sufficient water pressure for this purpose. A short circuit current reached one hundred amperes, thus causing internal heating in the windings.

The internal heating was found to raise the temperature of the winding sufficiently and the external heater was removed. Dry, cool air was then blown into the top or hottest part of the generator, thus considerbly lessening the temperature differential between the hottest and coldest points in the winding. This permitted a greater circuit current and higher average temperatures to be maintained, without endangering any one section by overheating. Localized heating, caused by heaters installed in the pit of the machine, further decreased the temperature differential from 20-25 degrees to 3-6 degrees centigrade. This decrease in temperature differential caused a considerable increase in the drying rate.

In later drying stages an effort was made to remove the final traces of moisture that still remained in the insulation.

Since the major part of the heating was internal, there existed a decreasing temperature gradient between the copper and the air. While constant temperature was maintained on the machine, this gradient remained unchanged, and any moisture between the copper and insulation, although tending to move towards the colder sections, was physically prevented from leaving the winding.

However, if the gradient was varied rapidly, the layers of insulation tended to separate slightly due to uneven heating or cooling, and the moisture moved towards the cooler sections, gradually being expelled at the open coil ends. Whether the machine was being heated or cooled, the temperature gradient always decreased from the copper outwards, thereby insuring that the moisture was always being forced out of the winding. A cycle of three days of heating and one of cooling proved to be most effective.

While the unit was cooling, megger and temperature readings were taken repeatedly. The resistance of the stator insulation to

ground was plotted against the average winding temperature on semi-logarithmic graph sheets. The straight line characteristic curves thus resulting were used as an indication of the dryness of the unit. From consideration of the gradual improvement in the characteristic curves obtained as drying progressed, and from the fact that the daily megger readings had now reached a steady value, the unit was deemed dry and ready for further tests before being placed in service.

Machines which had been severely flooded were successfully dried using the vacuum tank method. In this case the armature windings were enclosed in a large vacuum tank fabricated from rolled steel plate. The various joints were sealed with ordinary one-half inch garden hose. The ventilating openings in the stator frame were blocked with small castings drawn tight on soft rubber gaskets. All the small cracks and spaces around the bolt holes were taped and covered with caulking material.

This vacuum tank was then coupled to a condenser and the intake side of an air compressor. A vacuum of 26 inches of mercury was readily sustained in the tank. As before an insul board house was then constructed around the tank. A fan and heater were used to introduce warm air into the vacuum tank through a suitable inlet. This heating was assisted by applying a low direct current voltage to the armature winding. When the winding temperature reached 90 degrees Centigrade, the inlet air was cut off and the tank sealed, the warm air being now directed to the outside of the tank, thus maintaining nearly the same temperature inside and outside thereby reducing the heat loss.

The air was then slowly evacuated from the vacuum chamber in steps of about five inches of mercury. Care was taken as the pressure decreased that the temperature of the windings was not high enough to develop sufficient steam pressure inside the coil to burst its insulation. The changes in pressure and temperature were regulated to condense about one-half gallon of water per hour.

The machine was then gradually heated and cooled in the same manner as before and characteristic curves were again plotted. When no more moisture was obtained in the condenser and the characteristic curves had reached a sufficient value, the unit was deemed dry and the vacuum chamber was removed. The coil ends were retaped and the machine was ready for further tests.

Modern Steam Locomotive Design

By F. H. HOWARD

Condensed from Thesis submitted for the Degree of B.A.Sc. in Mechanical Engineering

The steam locomotive, in spite of competition from electricity and internal combustion, continues to be the railroads' first choice for versatility, economy, and capacity for overload.

Up to fifteen years ago designers paid little attention to anything except tractive effort, or drawbar pull, a feature exemplified in features which would be considered unthinkable in a modern locomotive, but which served well to haul heavy loads at low speeds. However, competition has demanded motive power able not only to start these loads, but to haul them at high speeds, so that tractive effort, while still the measure of starting ability, has been placed second to drawbar horsepower, which may be traced back to cylinder horsepower and finally to the boiler.

Boilers are designed to supply steam sufficient, not only to keep the greatest loads running at high speeds, but also to operate auxiliary attachments, such as stokers, boosters, and water preheaters. These supplements, by their economies, save more steam than they use, leaving the boiler with greater capacity than that required for its nominal duty. An outward sign of the larger boiler and firebox is the adoption of the four-wheel trailing truck.

A trend is noticed towards four-cylinder design, without necessarily articulation. Whereas formerly, permissible axle loads imposed as many as ten driving axles—divided between two independent engines in order to negotiate curves—nowadays the destructive effect of "hammer blow" on the permanent way has forced the division. Indeed, the Association of American Railroads has recommended a four-cylindered engine of the 4-4 coupled wheel arrangement in its design for a passenger locomotive capable of hauling 12 cars, or 1,000 tons, at a sustained speed of 100 mph., and has built to that design the Pennsylvania's engine displayed at the New York World's Fair.

Tractive Force

When a locomotive is demanded for a specific service, the designer must ascertain the tonnage, the speed at which it is desired

to be hauled, and several characteristics of the line. All can be translated into resistance in pounds per ton, and from this, the engine's drawbar pull can be calculated. Resistance has several components, the principal ones being as follows:

Level rolling resistance, which decreases with unit weight and increases with speed.

Grade resistance, which is calculated from the ruling grade.

Curve resistance.

Acceleration resistance.

Locomotive internal friction.

Head-end air resistance—the effect of streamlining is to lower this one factor.

Tractive force is defined as the force exerted at the rail by the driving wheels, and differs from drawbar pull, which is the amount the engine can lift, by the force required to move the engine and tender. It must be sufficient to overcome all resistance.

Therefore, at a given speed, $TF = (T \times R_t) + (E \times R_e)$

where TF = tractive force in lb.,

T = tonnage hauled in tons,

R_t = train resistance in lb. per ton,

E = engine and tender weight in tons,

R_e = engine and tender resistance in lb. per ton.

The tractive force now becomes the basis for design of the driving gear and when computed, it is divided by a speed factor to give starting tractive force. This speed factor is the ratio of mean effective pressure to boiler pressure, and takes into account the reduction of cylinder pressure by the shortening of cut-off since locomotive operation requires only enough steam to keep the train rolling at the desired speed. The shorter cut-off, combined with wire-drawing in the ports and steam-pipe friction, lowers this factor as the speed increases, as shown in Fig. 1.

Starting tractive force is given by the relation $TF = \frac{k P D^2 S}{Dr}$

where TF = starting tractive force in lb.,

P = boiler pressure in lb per sq. in.,

D = cylinder diameter in in.,

S = cylinder stroke in in.,

Dr = driver diameter in in.,

k = factor.

This factor k is another factor modifying boiler pressure, depends on the starting cut-off, and ranges from .6 to .85. Locomotives are not started at cut-offs greater than 90% because of piston clearance, and when cut-offs as low as 50% are used, some auxiliary method of supplying steam is necessary.

The size of drivers is determined by the service intended for the engine, and to a certain extent by the permissible length of rigid wheelbase imposed by curves. Passenger engines usually employ drivers in excess of 70 in. diameter, while freight power is fitted with wheels up to that size. Large drivers are required to keep piston speeds within safe limits when used with a crankpin having a throw of 15 in. to 16 in., which necessitates a cylinder stroke of 30 in. to 32 in., outside which limits cylinders are rarely built.

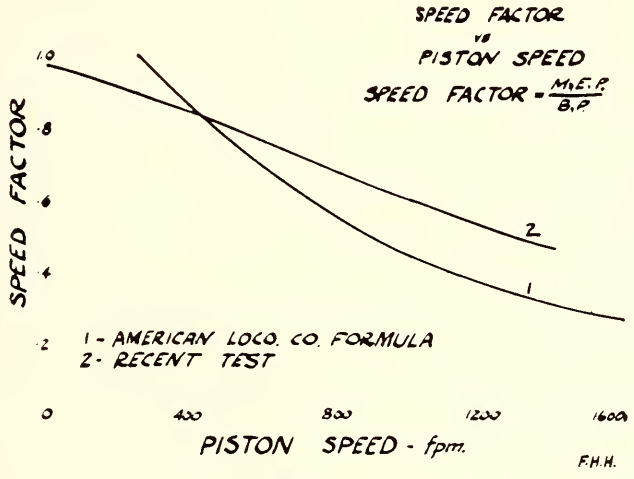


Fig. 1

Modern fire-tube boilers operate under a steam pressure of 310 lb. per sq. in., achieved by silico-manganese and nickel steel boiler plate. The unknown now remaining in the equation is cylinder diameter, which is found to vary from 23 in. to 31 in.

Locomotive designers aim at a factor of adhesion which will just allow the machine to slip its wheels. Factor of adhesion is the relation between weight on drivers and tractive effort, and ranges from 3.6 in heavy freight engines to 4.6 in fast passenger engines.

When the weight on drivers has been determined in this way, the engineering department's restrictions on weight concentration produce the number and spacing of driving axles. What may be a six-coupled engine on a road with a high loading limit would be an eight-coupled engine on a road with lighter bridges and track.

Horsepower

Strictly accurate work would demand a calculation of steam consumption from the knowledge of cylinder dimensions, with modifications for clearance and compression pressures, but current practise uses the familiar horsepower formula. It is known that for two double acting cylinders, as in a locomotive,

$$HP = \frac{4\ P\ L\ A\ N}{33000},$$

The mean effective pressure at starting is again considered to be about .85 of the boiler pressure, so that

$$HP = \frac{4 \times .85\ P\ L\ A\ N}{33000}$$

$$= \frac{.85P \times 2A \times S}{33000}$$

where S is the piston speed in ft. per minute.

Since power is a function of speed, it rises with speed. But the speed factor now modifies the power, only allowing it to increase slowly, until at about 1800 fpm. piston speed, excessive throttling causes the power curve to drop. The American Locomotive Company has found that 1000 fpm. is necessary for maximum power, giving a speed factor of .445 from Fig. 1. The Canadian Pacific has raised the factor to .535 for boiler pressures over 250 lb. per sq. in.

Road and laboratory tests have shown that one 1HP-hr can be obtained from 15 lb. steam and 2.75 lb. coal. The evaporative qualities of the boiler, and the combustive properties of the firebox are therefore calculated directly from horsepower figures.

With a good quality soft coal, with a heating value of, say, 14000 BTU/lb., the maximum recommended rate of conclusion is 120 lb. per sq. ft. per hour, and while higher rates of firing have been used, the results show a lower evaporation per pound of fuel and therefore wasteful practice.

Evaporation occurs in the firebox at the rate of about 55 lb per sq. ft. per hour, and the firebox heating surface is designed to be about 1/15 of the tube and flue heating surface, and 5 times the grate area. Evaporation in the tubes and flues depends on their length and spacing. The length between tube sheets varies from 20 to 24 ft. in the average boiler which, incidentally, reduces the smokebox temperature to 600° F., which is 25% below that

recorded in the old 12 to 14-foot tube boilers. This drop shows a greater loss of temperature after the gases leave the firebox at about 1800° F., with a consequently greater evaporative value.

The choice of tube spacing depends principally on the quality of feed water, bad water demanding a wider spacing than good. As the tubes are moved apart, fewer of them can be put in the boiler, but the loss of heating surface and evaporative capacity is partly offset by the better circulation of water and discharge of steam. Therefore the equated heating surface gain or loss is taken as one-half the actual.

Dividing the evaporative value by about 5.75 gives the heating surface in sq. ft.

In recent years, a large increase in superheating surface has been incorporated into boiler design, an increase which was necessitated by (1) the lower amount of heat available for superheat because the larger firebox absorbed more of it, (2) the increase of water in the saturated steam due to the large steam space, and (3) the higher capacity required without sacrificing efficiency. Considerable increases both in fuel economy and boiler evaporation can be realized when the boiler feed water is pre-heated by exhaust steam.

Counterbalancing

No item has received more attention in recent years than the balancing of reciprocating and revolving parts. Serious problems of track and locomotive maintenance can be traced to the destructive forces arising from improper balancing.

Counterbalancing is carried out in two parts.

Revolving weights—The weights, say on a main driver, consist of half the weight of the side-rods, the crank and crank pins, the eccentric arm (equivalent weight at crank pin), and the rotating portion of the main rod. The apportioning of the main rod weight is the subject of discussion, but Canadian Pacific Railway practice is to take 5/6 of the scale weight of the big (revolving) end as rotating weight, and the remainder as reciprocating.

The rotating balance on the main drivers of large locomotives is usually divided in two parts, the main and secondary balance, the former being mounted on the same wheel as the rotating parts.

If all the balance is mounted there, the two wheels and axle are statically balanced only. But when they are turned, the out-

of-plane condition of the rotating weight and the balance set up a couple and since the crank pins on the two sides are 90° apart, an undesirable rocking results. To balance this couple, the secondary balance is placed on the other wheel directly across from the pin and its size calculated by moments.

The cross-balance is either bolted to the spokes, or cast together with the primary balance for the opposite wheel.

Reciprocating weights—It is well-known that it is impossible to balance out the reciprocating forces in any engine with a so-called short connecting rod. If no balance at all is applied, the result is a longitudinal shaking force, whose effects on a locomotive become evident in two ways, the first of which is a reversible rotation about the vertical centre line, causing nosing from side to side with a consequently poor riding quality, while the second is a direct longitudinal vibration with an increased stress in the frame members at the driving boxes.

If complete reciprocating balance is applied, the horizontal forces become unbalanced vertical forces, causing a dynamic augment which is shown by a hammer blow on the rail when the balance weight is at the bottom position, and lifting of the wheel from the rail at the top position. It is seen that a compromise must be struck, which will do the least damage, measured by cost of repair or replacement, and this is obtained by partial balancing of reciprocating weight, usually divided equally among all driving wheels. This is called "overbalance" and is cast together with the rotating balance.

The reciprocating weight to be considered includes the piston and rod, the valve assembly and adjacent gear, the little end of the main rod, and the remainder of the big end.

The value of the dynamic augment produced by the overbalance is obtained from the equation

$$A = \frac{w}{g} r \cos \theta \omega^2,$$

where A = dynamic augment in lb.,
w = weight of overbalance in lb.,
g = acceleration due to gravity in ft. per second per second,
r = distance c. of g. overbalance to axle in ft.,
θ = crank angle in degrees,
ω = angular velocity in radians per second.

This is combined with two rather obscure and usually neglected forces to produce the resultant force on the rail. These forces vary with the angularity of the main rod, and are the vertical component of the piston thrust, calculated from the indicator diagram, and the inertia force of the reciprocating parts. They are represented in a typical locomotive by Fig. 2.

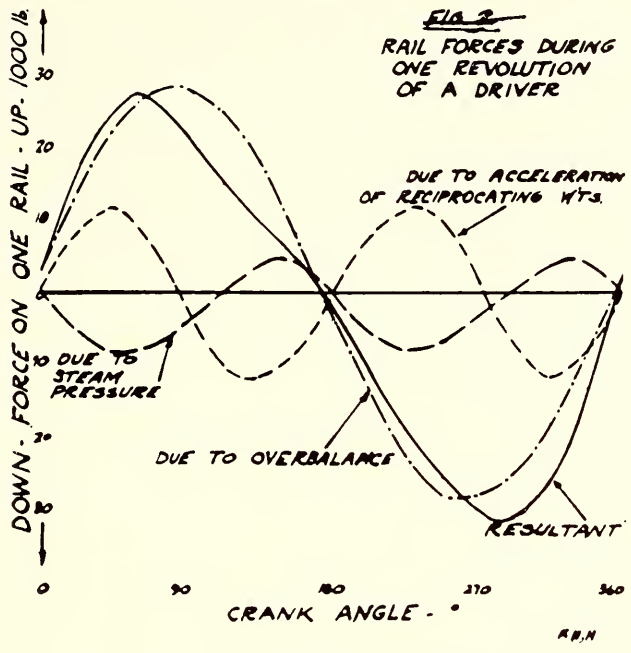


Fig. 2

It is evident that once an engine is balanced, a certain speed gives a value of this resultant that exceeds the static weight on any particular driver, which driver then leaves the rail.

Since the curve of the resultant follows closely that of the dynamic augment, due to the frequency of the two lesser components being twice that of the augment, it is usual to calculate balance from the allowable augment only. The speed selected is often "diameter speed", which is a speed in mph. equal to the driver diameter in inches, this being a good average. Arbitrary rule, is to set the percentage by which the dynamic augment is allowed to change the static weight at diameter speed. As stated above, when highly excessive speeds are reached, this percentage exceeds 100, but in design, a maximum of 50 per cent is quite general, and on the Canadian Pacific Railway, this practice results in the weight of balanced reciprocating parts being 50%-56% of the total reciprocating weight.

Indiscriminate removal of overbalance, while reducing the augment to zero if desired, affects the riding qualities. But to quote Kenneth Cartwright, "The crux of the whole situation depends on how much unbalanced reciprocating weight can be allowed in proportion to the total weight of the locomotive, not on the percentage of reciprocating parts balanced."* This ratio is, in the end, what causes poor riding qualities. Nosing on a modern engine is of relatively little consequence, since the large polar moment of inertia makes it less pronounced. A value of 3 lb. of unbalanced weight per 1000 lb. total weight is good practice, with many cases of lower ratios being applied.

In order to eliminate damage due to slipping in high-speed service, designers maintain that the overbalance should not be much greater than 100 lb., regardless of the percentage balanced. This demonstrates the importance of light-weight reciprocating parts, in order to give due consideration to riding qualities. Such parts, with their accompanying low overbalance have been made by the Timken Roller Bearing Company, and show reductions of 60 per cent in dynamic augment, and 35 per cent in horizontal forces.

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*"Railway Age", March 25, 1938.

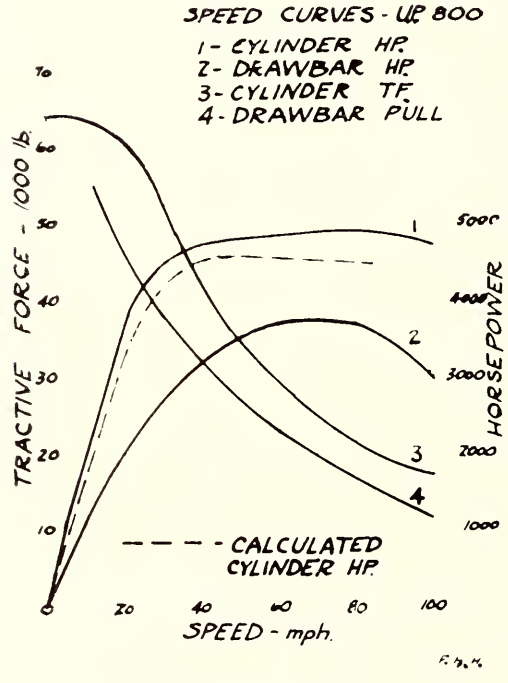


Fig. 3

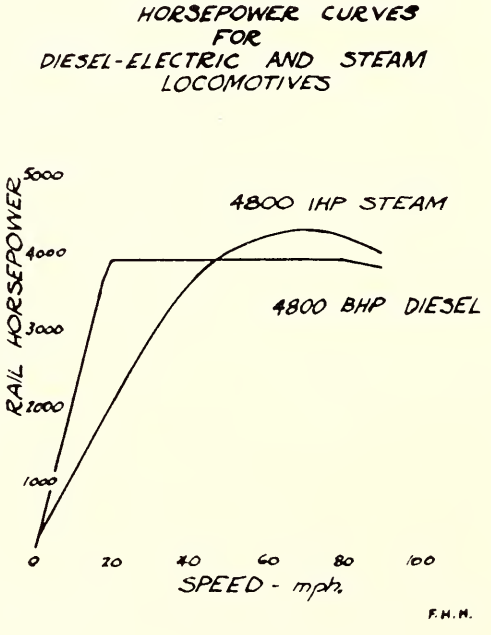


Fig. 4

Locomotive Characteristics

The formula for horsepower can be translated into the relation between it and tractive force.

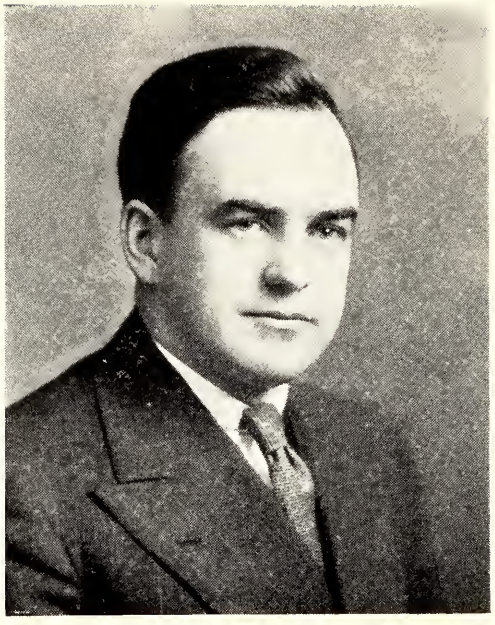
$$HP = \frac{4 \times .85\,P\,L\,A\,N}{33000} \text{ ft. lb./min. for 2 double-acting cylinders.}$$

$$= \frac{TF \times mph}{375}$$

When applied, it gives the curve shown in Fig. 3, compared with the results obtained from test.

Fig. 3 also shows the behaviour of power and tractive effort as the speed increases. The difference between cylinder and drawbar horsepower is due to frictional losses, while the difference between cylinder tractive force and drawbar pull represents the effort needed to move the engine and tender.

The rising speed curve is contrasted with that of the Diesel-electrical in Fig. 4, and may show a reason for the continuing use of steam on high-speed runs, despite the inroads made by the other form of motive power.



PROFESSOR G. R. LORD,
B.A.Sc., S.M. (M.I.T.), Ph.D.

Professor G. R. Lord was born in Peterborough, Ontario, and graduated from S.P.S. in Mechanical Engineering with the Class of '29.

During 1929-30 he was engaged in the Inspection Department at General Motors of Canada, Oshawa. After spending a year as demonstrator in Hydraulics he went to the Massachusetts Institute of Technology on a graduate scholarship, obtaining the degree of Master of Science in 1932.

In the Fall of 1932, he was awarded the John R. Freeman travelling fellowship of the American Society of Mechanical Engineers, and spent the next fifteen months studying in Europe, chiefly in Berlin, Munich and Karlsruhe, Germany. As a result of the studies undertaken during this period, and later completed in Toronto, he was granted the degree of Doctor of Philosophy by the University of Toronto in 1939. He returned to the staff as Lecturer in Mechanical Engineering in January, 1934.

Summer vacations during his college course were spent with the Peterborough Utilities Commission and General Motors of Canada. He was for two periods, of several months duration, assistant to the Director of the Technical Service Council of Canada. He has been twice associated with the Hydro Electric Power Commission of Ontario, on hydraulic model and other studies. Since 1936 he has undertaken work in Mine Ventilation in connection with which a course for the fourth year Mining students was started in 1937. He has actively co-operated with three large gold mines and one base metal mine regarding their ventilation problems.

Curriculum Investigation

During December, 1939, and January, 1940, the University of Toronto Engineering Society organized a student committee in each department of the Faculty of Applied Science and Engineering to study the curriculum of each department and to present a report of findings. This was done with the end in view of determining, if possible, a comprehensive cross section of opinion from the whole student body on the relative merits and demerits of the courses as presented, with a view to revising any weaknesses in the present methods so that the course in Engineering at this University may best fulfill the purposes for which they are being conducted.

The chairmen of these committees presented their reports before several emergency meetings of the Engineering Society Executive for general discussion. The reports were then revised as each committee deemed necessary and combined for presentation to Dr. Dugald C. Jackson, of the Massachusetts Institute of Technology, who was in charge of the investigation.

Under a well laid out plan the committees approached the problem intelligently and their reports reveal a very careful and complete coverage of the entire curriculum for all years. Among the important points considered were the following:

The improvement, removal or changing of certain courses to different years.

The inclusion of more non-technical courses such as English, Psychology, Languages, Business Administration, etc.

A revision of the present lab report system.

The introduction of mimeographed notes with amplifying lectures in stated lecture courses.

One afternoon of seminar for all years of each department for the purpose of better acquaintance of fellow students, and for supervised public speaking, etc.

It is felt that the outcome of this survey under Dr. Jackson will possibly result in a decrease in the number of lectures, to allow more time for research, and, at the same time, provision of better facilities for training and closer continuous contact with the world of industry.

The 1923 Engineering Alumni Bursary
The Women's Mining Association Bursary

The graduate class of 1923, and the Women's Mining Association have each kindly presented Bursaries to the Faculty of Applied Science and Engineering. To these two associations the Faculty owes many thanks for the tangible interest shown in offering opportunities for the advancement of scholastic and general ability.

The 1923 Engineering Alumni Bursary is awarded annually to a student completing the second or third year; it may be awarded two years in succession to the same student but will usually be awarded at the completion of second year.

The Women's Mining Association Bursary is awarded to a student entering the third or fourth year in the Department of Mining Engineering, Metallurgical Engineering, or Mining Geology; it may be awarded two years in succession to the same student but will usually be awarded at the beginning of the third year.

Each of these bursaries, having the value of one hundred and fifty dollars annually, commencing 1939, will be awarded to the students selected by committees of the respective organizations, on the following basis.

(a) In addition to mental capacity, the student must show leadership ability and give promise, through his activities, of becoming a worthwhile influence in the affairs of the profession and the community.

(b) While attention is given to scholastic ability, as evidenced by his academic standing, it is not the governing factor. He must, however, stand in the top quarter of his class.

(c) Special consideration is given to financial need.

Applications must be made to the Secretary of the Faculty within one month of the opening of the academic year.

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1940

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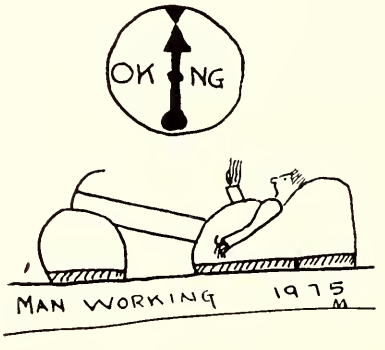
Dog Tricks

BY M. J. C. LAZIER

As time goes on, and the human race evolves, the tasks which must be performed by the average individual become more intellectual and less physical. This is shown by the continued increase in the use of other forms of energy than that supplied us by our food! We are carried about, the ground is ploughed, the crop harvested, the products of the earth processed more and more by machinery, driven by some form of prime mover or energy converter. Physically the man in charge sits on a chair all day and reads a book. Once an hour he glances at a meter, or a dial, or a gauge, and thinks. He thinks about the reading of the meter. If he thinks one thing he goes back to his book! If the other, he pushes a button, and some of the energy of the prime mover is used to service the prime mover. The delay in reading the book is short, and the expenditure of physical energy small. The decision made by the man, however, is of weight—it keeps the machine running.

The same kind of thing goes on socially, and politically. We have police and a system of jurisprudence behind them, which leave every man a cell big enough for him to do as he likes without disturbing his neighbours too seriously. The quiet, law-abiding person with lots of room in his cell, never touches the walls—he even forgets they are there, except the sharp corners like parking and speeding! Politically, too, the pressure of the State on the individual is light—in this country. It is natural, then, that we extend our physical ease to the domain of the mind, and even to that of the spirit.



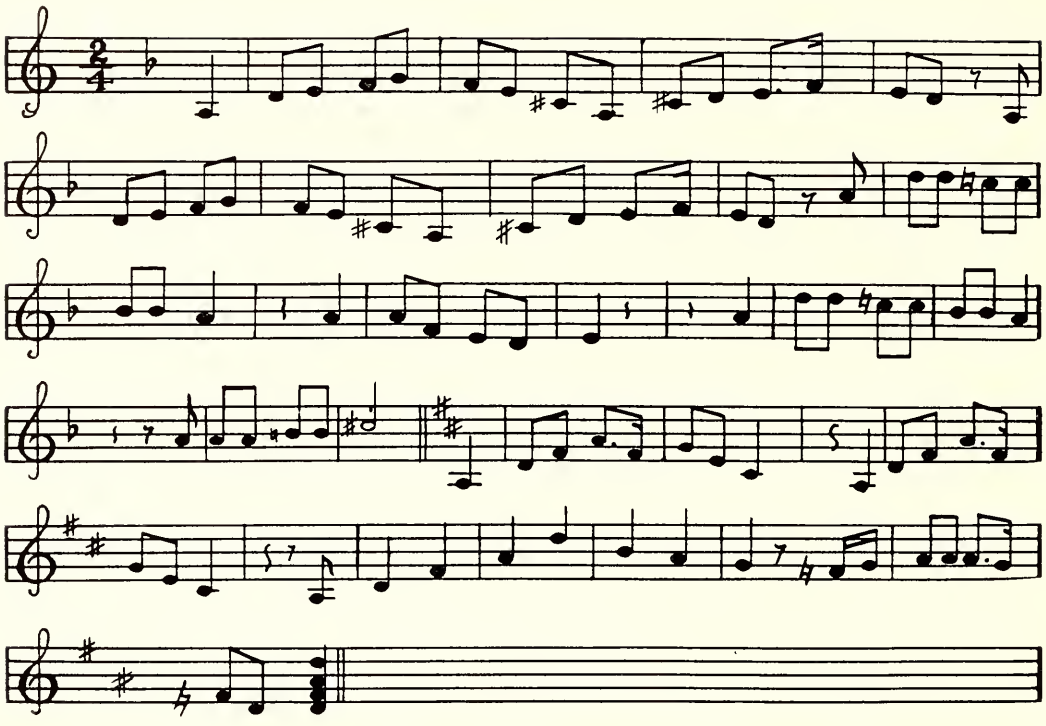
In general the training of the tradesman is a training in physical action. He learns how to control or manipulate tools.

The reasons given him for many of the things he does may or may not have a basis in scientific fact—however, they have been found to work—and sometimes they are beyond scientific explanation. This kind of training belongs to the same general group as Pavlov's conditioned reflexes. You know what happens when you smell food, and are hungry. In other words, the tradesman, in general, acts more than he thinks.

The training called education, on the other hand, has always dealt with ideas. The educated man should be able to manipulate thoughts with the same skill with which a good mechanic handles a file. The difficulty we are now into is that the training required by the engineer, to improve and maintain his mechanical help, is more like the training of a tradesman than it is like the training called classical education. This makes the engineer tend in the direction of narrowness of mind, and limits his skill in thought to his own work.

However, there is a solution to this, a solution which lies in the hands of every engineer. It lies in the meaning of the word "amateur". An amateur is basically one who does a thing because he is driven by an inner compulsion. He strives for perfection, not because he can sell it, but because he loves it. The engineer, to balance his training, requires a large measure of abstract, detached thought—and this can only be obtained by careful, affectionate work, in those fields of Philosophy left unexplored by him as an undergraduate. By this means that relaxed deftness—that lightness of touch which is skill—may be had with ideas, with the stuff of the mind.

And when we can get enough engineers to apply that ability to prophesy the behaviour of material in a structure, to the behaviour of the economic structure, then there will be living room in the world, and a very good living it will be.



While lucky friends of mine
disport
In haunts of relaxation,
I sit and do this lab report
Absorbed in calculation.
And as I draw a graph of X
Upon the base of Y,
I think about the fairer sex:
Oh, miserable am I. For—

Chorus:

I've got to do a lab report
With graphs, and curves of
every sort.
It isn't my idea of sport—
But the damn thing's due to-
morrow.

I know a girl in Whitney Hall,
I'd like to take her dancing,
She doesn't seem to mind at
all
When Ford V-8 romancing.
As I divide the cube of pi
By twenty-nine point three,
My girl is dancing with a guy
Enrolled in Trinity. But—

Chorus:

One often hears the Engineers
Can drown away their sorrow.
But how can I consume those
beers?
My lab is due tomorrow.
I'd like to drink till I was
numb,
From ethyl alcohol,
I'd drink up Scotch, or rye,
or rum,
Or anything at all. But—

Chorus:

The faculty of Arts is fine
For social entertainment.
Six days a week I go at nine,
Oh, pity my enchainment.
Were I in Arts, I'd kick the
gong;
I'd seldom go to bed.
With wine, with women and
with song,
I'd paint the Campus red.
But—

Chorus:

First Year Hobbies

You know only too well those moments when the book you could hardly tear yourself away from last night suddenly turns dry as dust? When you have studied Calculus till your brain is saturated with differentials and integrals? When you have a terror of a cold and wish you were at school? Those are the times when a hobby would make the hands of the clock go round without stopping to strike the hours.

A rough survey was made of the hobbies of the first year just to see what the boys did when they weren't studying! Maybe from this you will derive an idea for a hobby to fit in that spare moment. If you don't, bear along with me anyway.

Probably some rough statistics on the leading hobbies might give a good indication what avocations are going on. Believe it or not, stamp collecting leads the list with forty of the frosh in the mad search for the seemingly worthless squares of coloured paper. Following closely upon its heels comes photography, with a total of thirty aspirants. About fifteen engineers can not only use their heads, but also prove their fingers are not all thumbs by doing woodwork. Radio is one hobby that intrigues many of us, but few ever reach the heights of passing their amateur license examination. There are about half a dozen "hams" in first who are not operating at present due to the war, but it won't be long now, we hope, until once again they will be sending out their beloved "C. Q."

Here are some of the unique hobbies of the lowly frosh. A gentleman whose name we are not divulging, when asked about his hobby, answered curtly, "sparkling". What this hobby pertains to is difficult to say! Probably it is an avocation derived from high voltage discharges and if so must prove quite shocking.

Then there is the engineer whose hobby is knitting. Bless his little heart! Excuse me, on closer examination we found that it was an "enginette". It looked for a moment as if tradition had "Gone with the Wind".

One of the finer arts has at last reached S.P.S. by means of one of the freshmen. Paul Clark composes music. This is all we could extract from the shy individual, but, if you would like to know more, consult him.

John Diak's pastime is old English lettering, more than likely

he enters into the spirit of it by visiting "Ye Olde Tavern" where he gets his ideas from old English surroundings.

In Chemical, there is a little man with an exuberant vocabulary. This little fellow nicknamed "Joe" before giving out his hobby made quite sure nobody was within 50 yards of him before he whispered "toxicology". This proved a bit too much for the author, who collapsed in a heap on the floor. After a moment or two in the throes of great pain, he managed to make his way to the nearest bookcase to clutch in both his shaking hands a dictionary. Anxiously turning the pages, eyes blinking, ears twitching, he thumbed on. At last, what a relief! The word only meant the study of poisons.

Aside from these queer hobbies, there are two fellows who indulge in archery—or is it playing cupid? Believe it or not, we could only find one engineer who had a partiality to swing! Maybe the modern generation is not all it is cracked up to be. Maybe there is still a flinching flame of hope for the salvation of youth! God bless 'em!

Since you have derived no ideas from all the foregoing palavering why not try copying out the Encyclopedia Britannica. Then in 20 or 30 years, you will have a personal set of books, no one else being able to read them. A gentle reminder of spare time well spent.

"Just About Women"

For the past twenty years only twelve females have been known to graduate from School of Science. This year, twelve "Enginettes" are to be seen flitting from lab to lab and generally brightening up the surroundings for the rest of us ordinary engineers.

It was with a certain amount of trepidation that this assignment to produce a Women's Page was accepted, but after a few interviews, it was found that the girls had a secret longing to have their pictures taken and to be asked a lot of personal questions. (Did I hear a feminine laugh?) Among other things, was learned the futility of attempting to find an "Enginette" at home on a Friday night. This was news, but what was even more startling was the degree to which these S.P.S. girls resemble Schoolmen. After a thorough investigation, it was brought to light that they do absolutely no work until Spring rolls around and then, like true Engineers they develop that common ailment—Spring fever.

On the serious side, these twelve co-eds form as popular, intelligent, and as charming a group of girls as is possible for any school to boast, and although some won't admit it, School is proud of her fair ones and wishes them the best of everything, both during and after their sojourn at this Faculty.

Hailing from as far away as England, the girls are engaged in three different kinds of engineering, namely, Architectural, Chemical, and Engineering Physics. It is not surprising to hear that they are doing well in all three courses.

After quite a bit of running around and not without a good deal of co-operation, the following facts were gleaned.

Graburn Nicholls, 23 years of age, lives in Toronto and is graduating this year in Chemical Engineering. Graburn, a natural blonde, before deciding on Engineering as a profession, attended Bishop Strachan School for thirteen years. She plays a good tennis set, dances, rides, and excels in figure skating, being Toronto Novice Champion way back in '34. After graduating, Graburn has hopes of taking up food chemistry lab work, in which she is specializing. In a burst of confidence she admitted that she hates to leave S.P.S., and has enjoyed every minute of

GIRLS OF SCHOOL

M. Stewart, J. Taylor, G. Nicholls, L. Blaylock, E. McRostie, P. MacCorquodale, G. Wagar, A. Rushbrook, C. Jones, I. Grace,
Inset: (left) M. Parkin, *(right)* S. Macdonald.

her stay here. The boys in her year all testify that she's a real sport and along with them we wish her the very best of luck.

Margaret Parkin, 20 years old, hails from Ottawa and is in her second year Engineering Physics. Elmwood was the scene of much studying before Marg came to S.P.S. Living at St. Hilda's, she is adept at tennis, and is often seen coming down a hill covered with snow, i.e. she skis. Very much interested in Aeronautics, she hopes to make this her career. R.C.A.F., here we come!

Sally MacDonald, 21 years, from Toronto, a quiet, unassuming little girl as any sophomore will recall, is a "freshette" in first year Engineering Physics. Sally gathered knowledge at Havergal, Oakwood and U.C. (one year) before hitting S.P.S. Her favorite hobbies are dramatics, swimming, hiking, camping and initiating. Later on, Sally intends to specialize in X-ray, Radio, or Telegraph work.

Gertrude Wagar, 20 years old and 5 feet tall, is the pride of Bowmanville. In her first year of Chemical Engineering, Gert has already, along with a friend, invented a carburator which is capable of 50 miles per gallon of gas. When she finds out what causes it to blow up unexpectedly she will be sitting pretty. Gert's favorite indoor sport is dancing and at the last School dance was seen teaching the Coki-Oki to an admiring bunch of freshmen. Gert claims she won't be back next year, but we hope to see her around when next year rolls around.

Audrey Rushbrook, 19 years of age, from Bloor C.I., Toronto, is also in first year Chemical and is only a bit taller than Gert. Audrey couldn't get into S.P.S. last year because of Upper School Geometry, so she spent an uneventful year in Ist year Pass Arts. Petrography students might be glad to know that Audrey has a sizeable collection of minerals. She is also an amateur photographer, and a good dancer, as she used to teach dancing. A Tri Delt pledge, little Audrey is getting along fine and has cut down to three-quarters of an hour for weighing one crucible, her associates claim.

Ailsa "Peggy" MacCorquodale, at the tender age of 18 years is in her first year of Chemistry. Hailing from Malvern C.I., Toronto, Peggy, a willowy brunette, is described by certain of her associates as "an awful flirt"—but this, of course, she denies. However, it is a well known fact in the Chem Lab that her calcu-

lations are not all original. She claims men are better mathematicians than women. Also a Tri Delt Fraternity member, Peggy is looking forward, at the time of writing, to her initiation and to a weird looking new Spring hat.

Claire Jones, also 18 years old, is a graduate of Humberside C.I. She is one of the harder working 1st year Chemicals. Described as a typically movie version co-ed, Claire plans to devote her future to the steel industry, in which she is really interested. A good swimmer and dancer, Claire intends to head her class into second year.

Louise Blaylock, aged 19, from way out in Trail, B.C., is in 2nd Year Architecture, and attended Miss Edgar's School in Montreal before coming to S.P.S. Louise, a tall blonde, often seen gadding about in that smart roadster, has a fine sense of humour, according to some of her associates. Writing original Valentines is one of her specialties. Along with others (?) from her department, Louise was often seen skiing on some of those extra nice winter afternoons. When in the draughting room, she works extra hard.

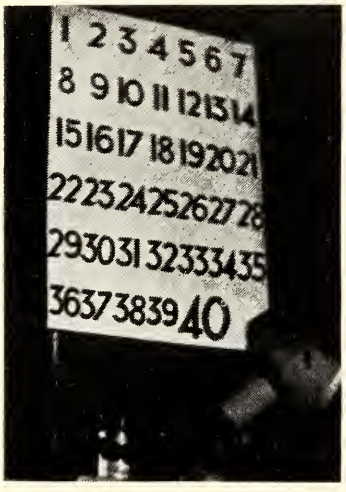
Jean Taylor, 20 years of age, is from Hove, Sussex, England, and was left here during a tour by the outbreak of war. She attended high school at Hove, England, and Châtelard, Switzerland, and also spent time at Brighton Art and Technical College in England. She enjoys swimming and starred at ground hockey over yonder. Jean is an interesting conversationalist, but don't get into an argument with her, you can't win.

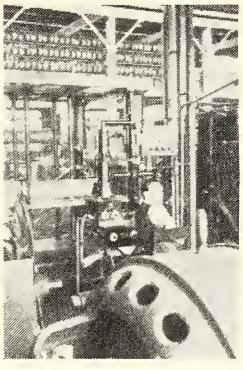
Ellen McRostie, 19 years of age, resides in Guelph, Ontario, and holds all records for the number of schools attended. Among the different places that Ellen has gleaned knowledge are Ottawa, Winnipeg, Guelph, and England, and she is now in 3rd year Architecture in S.P.S. "The little dark-eyed girl" claims she wasn't kicked out of any of these, but some people are suspicious. Skating is one of her favorite pastimes, but Ellen is very interested in collecting souvenirs, so if anyone is missing anything, oh well, we won't be suggestive.

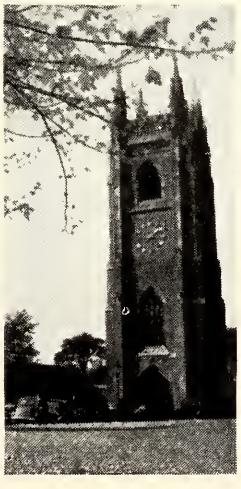
Martha "Marty" Stewart claims she is 21, but that is open for debate according to the rest of the 2nd year architects and some others. A Toronto girl, Marty attended school in Sarnia and also Vaughan Road Collegiate and B.S.S. in Toronto. Marty says that the girls at School have a better time than the girls in

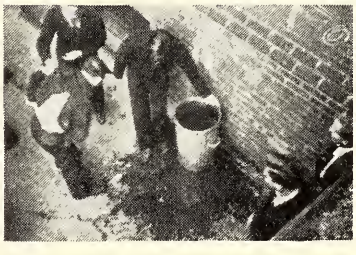
Arts and she ought to know, as quite a bit of her time is spent in proving her statement. Caught in a serious mood, one day, Marty confessed that her secret ambition was to get into third year.

Isobel Grace is also 21, and hails from the mountain city, Hamilton. She matriculated from Westdale Collegiate and is another 2nd year Architect. Isobel (don't call her Izzy) skis and also during the winter months is often seen dusting off the ice up at the Stadium. She gets a surprising amount of work done in the draughting room, considering actual time spent on the job. Isobel is another "afternoon Ski Artist".









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HON. VICE-CHAIRMAN

PROF. W. STORRIE
HON. CHAIRMAN

W. K. CLAWSON
CHAIRMAN

PROF. W. M. TREADGOLD
HON. VICE-CHAIRMAN

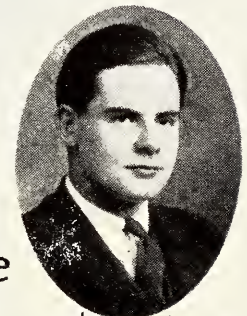
W. D. RAMORE
VICE-CHAIRMAN

CIVIL CLUB EXECUTIVE

Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

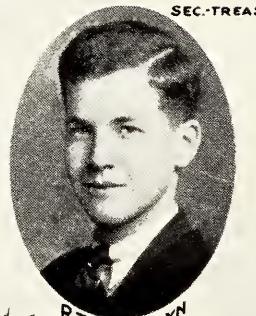
1939-1940



J. R. GUNDY
SEC.-TREAS.

W. G. GRIER
4TH YEAR REP.

E. C. BRISCO
3RD YEAR REP.



R. T. M. TANBLYN
2ND YEAR REP.

R. G. ROGERS
1ST YEAR REP.

Ireland Toronto

Civil Club

Tempus fugit! It seems inconceivable that the time is at hand when your chairman must put in black and white the club's activities for the past year. However, it is with pardonable pride that we record for posterity the various functions that contributed to such a successful year.

At the first meeting of the year, a dinner, the freshmen were welcomed to our select society. Professor C. R. Young spoke on "The Status of the Engineer in Canada",—a very interesting condensation of an important paper to have been given at a world conference of Civil Engineers.

On November 3rd, the Club had an interesting and entertaining trip to the Lackawanna plant of the Bethlehem Steel Corporation.

An an evening smoker held on November 29th, Mr. J. C. W. Irwin presented a very adequate discussion on the pressing need for "Conservation of our Natural Resources".

Professor R. F. Legget contributed to the activities of the Club at a second smoker held on January 30th. His entertaining and polished presentation of the relation of geology to engineering under the title "Building Downward", was of interest to all who heard him.

The annual luncheon meeting held on February 16th at Hart House was very successful, largely because of the most interesting and timely address of Mr. Tracey LeMay on "Traffic Control". At the Royal York Hotel Supper Dance on February 21st, the members had an enjoyable get-together with the ladies.

At the time of writing a joint meeting with the Architectural Club is being planned to culminate the year's program.

Any success that the Club has achieved in this year, or any other, naturally depends on the support which its members and friends give it. The executive should like, therefore, to extend a hearty vote of thanks to our Honorary-Chairman, Mr. William Storrie, for his keen interest in the Club; to the staff for their wholehearted co-operation; and to the members for their loyal support.

Finally, to the incoming executive, the best of success, and to one and all, the best of luck.

W. K. Clawson,
Chairman,

G. S. WILLSON
MINING GEOLOGY REP.

D. E. MILNER
SEC.-TREAS

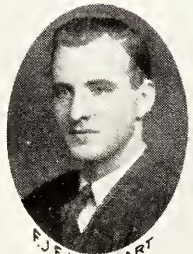
MR. R. M. P. HAMILTON
A.I.M.E. COUNSELLOR

J. F. S. BOLTON
CHAIRMAN

MR. N. F. PARKINSON
HON. CHAIRMAN

J. E. WILLIAMSON
VICE-CHAIRMAN

PROF. G. B. LANGFORD
FACULTY SPONSOR



F. J. E. LOCKHART
3RD YEAR METALLURGY REP.

N. A. CREET
4TH YEAR MINING REP.

MINING AND METALLURGICAL CLUB EXECUTIVE

W. L. COURTNEY
4TH YEAR METALLURGY REP.

E. L. HEALY
3RD YEAR MINING REP.

Faculty of Applied Science
and Engineering

UNIVERSITY OF TORONTO

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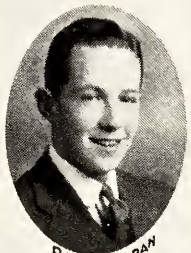
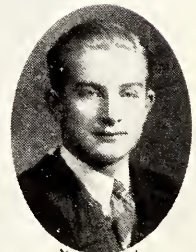


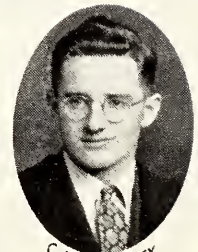
P. B. McCRODAN
1ST YEAR MINING REP.

W. A. MONTGOMERY
2ND YEAR METALLURGY REP.

Freeland
Toronto



W. V. SMITH
2ND YEAR MINING REP.



C. J. P. McNULTY
1ST YEAR METALLURGY REP.

Mining and Metallurgical Club

Our activities began on October 5th with the customary Initiation Smoker, held in the East Common Room at Hart House. This year the freshmen were introduced to the students of other years in a slightly healthier fashion than in the past. The party was, however, none the less humorous.

On November 7th, Mr. P. J. Dunlop, Ventilation Engineer, Hollinger Consolidated Gold Mines, Ltd., presented a technical paper "Dust Control at the Hollinger Milling Plant" to a joint meeting of the Mining and Metallurgical Club and the Mechanical Club.

Professor Dugald C. Jackson, Professor Emeritus of Electrical Engineering, M.I.T., who has been in Toronto most of the winter serving in an advisory capacity in the study of the Engineering Curricula at Toronto, favored the Club with his presence on November 22nd at a noon luncheon meeting in the Great Hall. Professor Jackson spoke for about forty-five minutes on the subject of "Engineering".

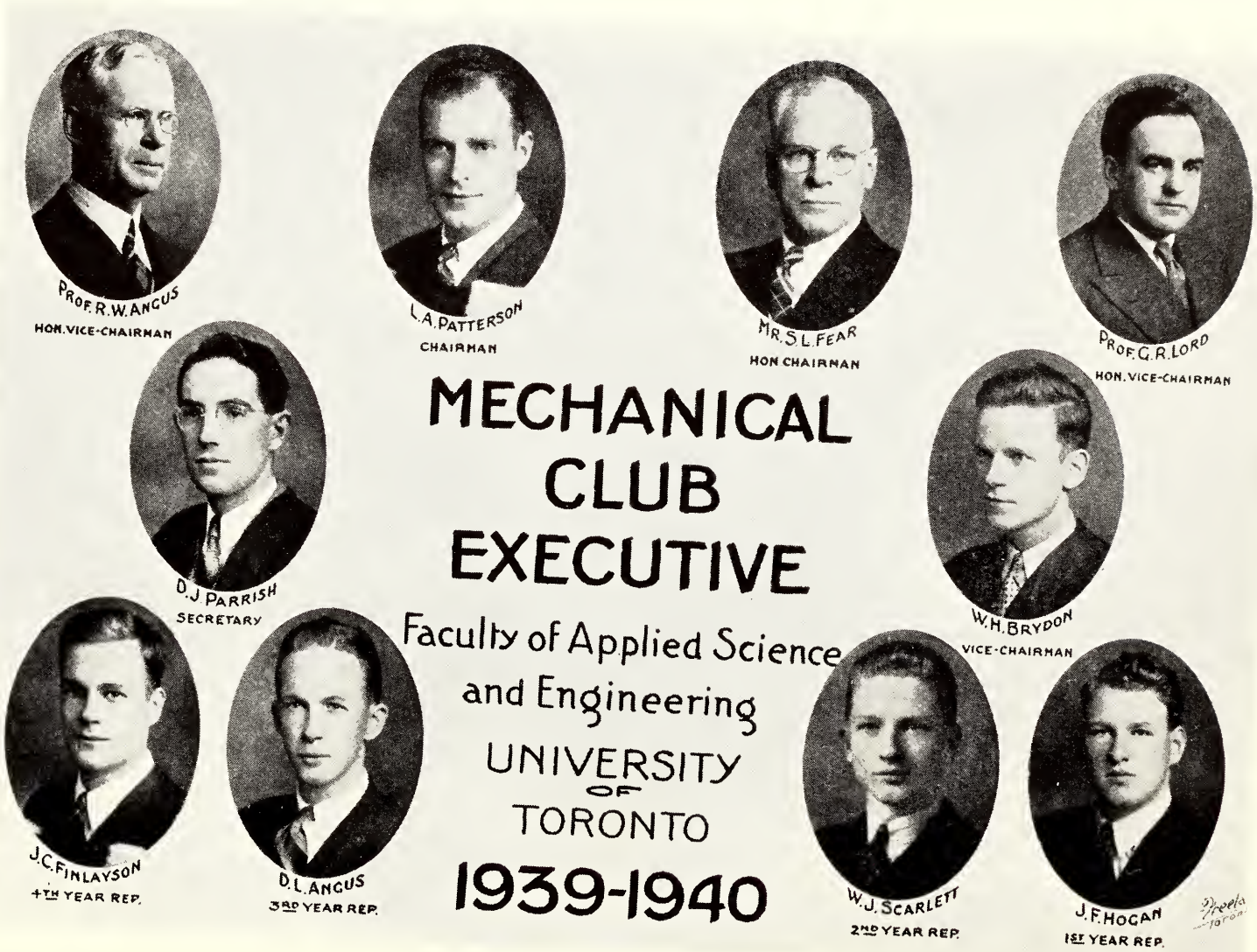
The first dinner meeting of the Club took place at the Canadian Military Institute on December 7th. Mr. Gordon Hardy, president, Falconbridge Nickel Mines, Ltd., gave a witty and instructive account of his operations and travels abroad during the earlier years of his professional career.

Immediately after the Christmas examinations, on January 5th, the Club dance was held at the Savarin. Although stormy weather prevailed outside, everything was fine inside, and those who saw fit to brave the snow and chill winds were amply repaid.

The second dinner meeting was held at the Savarin Hotel on Tuesday, February 27th. After a most delightful dinner, Mr. G. R. Southee of Canadian Ingersoll-Rand Ltd., gave a very interesting illustrated account of the history of rock drilling.

In closing, we wish to acknowledge our gratitude to Mr. N. J. Parkinson, our Honorary Chairman, for his great assistance in arranging programs for our dinners; to Mr. R. M. P. Hamilton of Central Engineering for accepting and carrying out the duties of A.I.M.E. Counsellor; to Professor Williams, Professor Guess, and Professor Langford for their kind guidance at all times; and lastly, but certainly not least, to the eleven members of the executive for their untiring efforts in all Club undertakings.

FRED S. BOLTON, *Chairman.*


PROF. R. W. ANGUS
HON. VICE-CHAIRMAN
L. A. PATTERSON
CHAIRMAN
MR. S. L. FEAR
HON CHAIRMAN
PROF. G. R. LORD
HON. VICE-CHAIRMAN
MECHANICAL
CLUB
EXECUTIVE
Faculty of Applied Science
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1939-1940
D. J. PARRISH
SECRETARY
W. H. BRYDON
VICE-CHAIRMAN
J. C. FINLAYSON
4TH YEAR REP.
D. L. ANGUS
3RD YEAR REP.
W. J. SCARLETT
2ND YEAR REP.
J. F. HOGAN
1ST YEAR REP.

The Mechanical Club

The Mechanical Club has now completed 12 years of successful operation as an independent club. The original Mechanical and Electrical Club was formed in 1907 as a purely technical organization. However, in late years, the Student Branch of the American Society of Mechanical Engineers has fostered the technical advancement for undergraduates as all those who attended the last Convention in Cleveland will duly appreciate.

At the first Club Smoker, Professor R. W. Angus gave a very interesting talk on "Hydraulic Development in Europe"—illustrated with the remarkable pictures that helped make this meeting the most successful of the year. Mr. W. A. Osborne, a former Honorary-Chairman of the Mechanical Club and Engineering Society President 2T4, gave a very interesting talk on "The Integral Furnace Boiler" at the second Smoker.

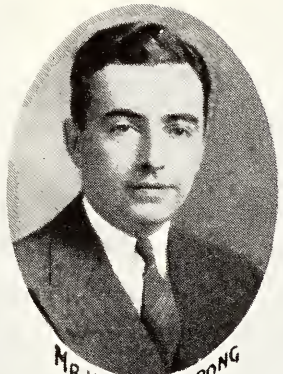
The third Smoker was held in conjunction with the Mining and Metallurgy Club at which Mr. J. P. Dunlop described "Dust Control Developments in the Hollinger Mines". At the fourth meeting, Mr. B. J. Elkin described "Modern Methods in Aircraft Production" and was very well received. Three student speakers, Doug Gardiner, Ernie Clifford, and Roy Day briefly outlined topics of interest in their experiences in aeronautics. On another occasion, the members of the Club were guests of the Student Branch of the A.S.M.E., when Mr. H. H. Angus spoke on "Practical Problems in Air Conditioning".

At the annual Club Dinner, the Club's Honorary-Chairman, Mr. Lorne S. Fear '04 was the speaker of the evening, the subject of his address being "Variable Constants in Engineering".

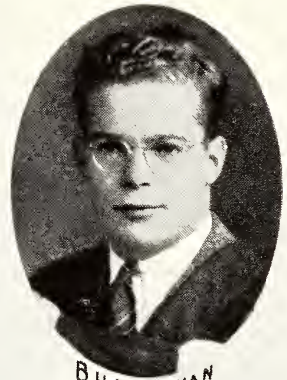
It is hoped that the activities of the Club have broadened acquaintances and instilled some of that intangible something called "School Spirit". The Executive wish to thank all the members of the Club for their support throughout the past season, Professor W. G. McIntosh for his kindness in arranging plant visits, and Professor R. W. Angus and Professor Lord for their interest and assistance to the executive.

LORNE PATTERSON,
Chairman,

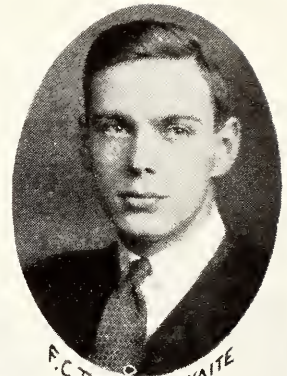
E.H. NOAKES
VICE-CHAIRMAN



MR. W.G. ARMSTRONG
HON. CHAIRMAN



B.H.M. TEDMAN
CHAIRMAN



F.C.T. ROUNTHWAITE
SEC.-TREAS.

ARCHITECTURAL CLUB EXECUTIVE

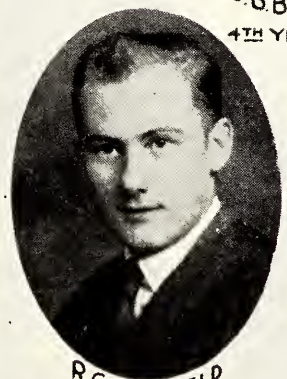
S.B. BARCLAY
4TH YEAR REP.

W. SHULMAN
3RD YEAR REP.

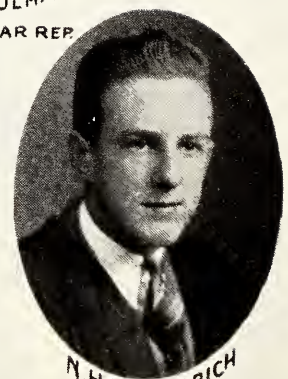
Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

1939-1940



R.C. FAIRFIELD
2ND YEAR REP.



N.H. McMURRICH
1ST YEAR REP.

Freeland
Toronto

Architectural Club

Heigh-ho! Another year, another graduate! But, however, the graduating year may have suffered numerically, the junior years are certainly making up for it. Our stay at Gull Lake camp this year was much more pleasant owing to the presence there of the girls of the second year, and Mrs. Carswell, who chaperoned them. The senior years found a certain quieting effect owing to their presence, which however, could not still their enthusiastic rendition of "Hymn 107" whenever the occasion seemed to demand it. Remember Paul Pentland's peculiar choice of bedfellows—imagine wanting to sleep with a canoe!

On our return to school, we viewed with mixed feelings the definitely unco-educational freshman class, who seemed to have acquired in a minimum of time the ability of making the maximum amount of draughting-room noise, beside not being particularly decorative. However, they have proved themselves a great bunch of lads, and will be an asset to the department and the profession.

It was a pleasant surprise to find a new student in the second year, and two new members in the fourth year. The three students are from English schools, where architectural teaching has been more or less discontinued "for the duration'. A real gain for us!

The war has also brought with it for us a tremendous influx of khaki-clad colonels and blue-bedecked wing-commanders for professors. And may we take this occasion to wish "Hank" the very best of luck—as the first of the staff to leave us on active service.

The Club has been functioning in its usual erratic fashion. Our meetings have been very interesting, but as a "piece de resistance" this year we produced something new in the line of student endeavor—an exhibition purposing to educate as much as possible the rest of the campus on modern architectural thought. Ambitious, but really worth while.

We had our annual dinner in conjunction with the opening of the show. It sure was a gala affair.

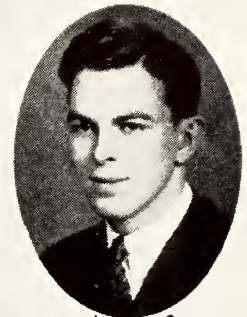
Well, kiddies, if Professor Madill will just put "Oh, sure" on all your Uncle's exam papers, Uncle Wiggly will tell you next year about how he won the Great War II, with, of course, some help from Ironside and Gort.

BLAKE H. M. TEDMAN, *Chairman.*

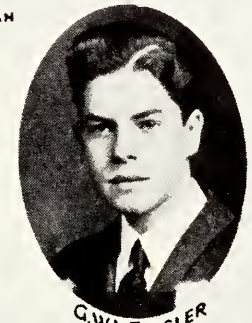
PROF. T. R. LOUDON
HON. CHAIRMAN

H. G. STARK
CHAIRMAN

V. V. MASON
VICE-CHAIRMAN

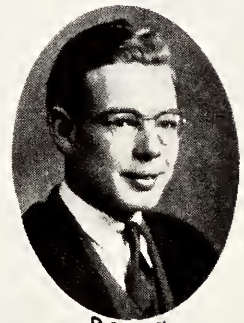


K. H. KIDD
SEC.-TREAS.



G. W. L. FLAGLER
4TH YEAR REP.

ENGINEERING PHYSICS CLUB EXECUTIVE

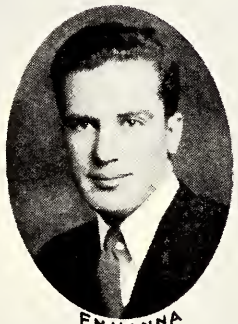


B. ETKIN
3RD YEAR REP.

Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

1939-1940



F. M. HANNA
2ND YEAR REP.

W. S. MISENER
1ST YEAR REP.

Freeland Toronto

Engineering Physics

The Engineering Physics Club was formed three years ago, in 1937, through the efforts of the first graduating year of the course. The ideas in forming the Club were, firstly, to give the students in the course of Engineering Physics a voice in the student affairs as directed by the Engineering Society; secondly, to afford an opportunity for the students to make and retain valuable friendships among men with interests similar to their own; and, thirdly, to promote an interest in the course among men in the profession of engineering likely to become employers of Engineering Physics graduates.

The program followed by the Club Executive this year was outlined with the above views in mind, with the result that the Club enjoyed its third year as a successful member of the Engineering Society.

The activities opened with our Annual Dinner at Hunt's, at which Dr. John Satterly of the department of Physics gave us a "double feature" talk on "The Union of the Engineer and the Physicists" and "War Conditions in England in the Fall of 1939". Following Dr. Satterly's address, the Sophs put on an excellent show which should be long remembered, especially by our Frosh.

The remaining activities of the Club consisted of Smokers held at Hart House at which such topics as "The Evolution of the Engineer", "Power Development in Ontario" and "The Work that is being Done by the Research Laboratories at Ottawa", were thoroughly discussed. Special mention should also be made of the excellent color moving pictures which Mr. Davison of the Ontario Hydro Electric Power Commission presented on the "Building of a Transmission Line in Northern Ontario."

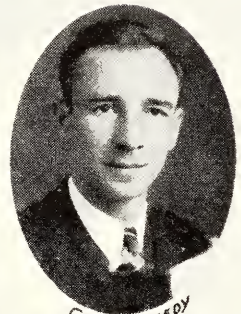
Following the innovation introduced by the Executive of last year, members of the Fourth Year presented talks on their thesis subjects, thus acquainting the junior years with the work ahead of them and providing experience in public speaking for the Fourth Year. In these talks such subjects as "Direct Current Transmission", "Flaps and Slots" and "Float and Hull Design" were discussed.

The apex of our social activities was reached on the 4th of December, when a dance was held in conjunction with the Electricals and Mechanicals at the Arcadian, and it was judged by those who attended to be the best ever.

HENRY G. STARK, *Chairman.*

DR. J.G BRECKINRIDGE
HON. VICE-CHAIRMAN

J.E. BUCHAN
HON. CHAIRMAN



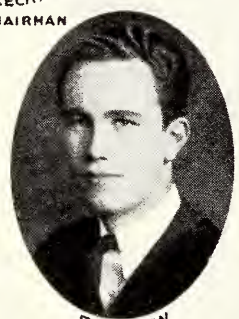
GEO. KENNEDY
CHAIRMAN

T.M. KINGSBURY
VICE-CHAIRMAN

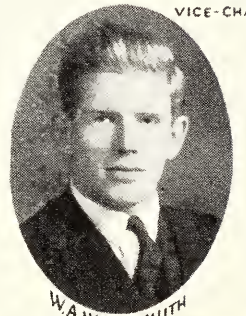
INDUSTRIAL CHEMICAL CLUB EXECUTIVE

Faculty of Applied Science and Engineering
UNIVERSITY OF TORONTO

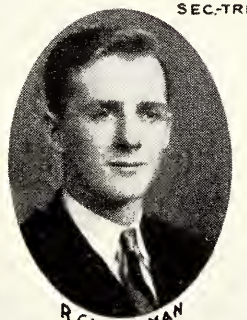
1939-1940



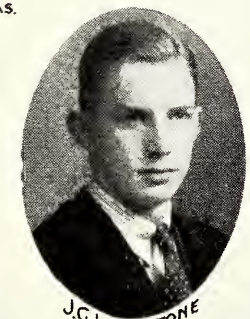
F.H. ALLEN
SEC.-TREAS.



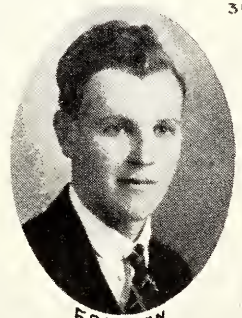
W.A. WACHSMUTH
3RD YEAR REP.



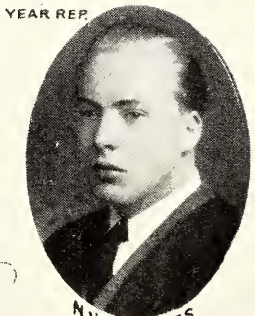
R.C. WORKMAN
2ND YEAR REP.



J.G. LIVINGSTONE
2ND YEAR REP.



F.P. MODEN
1ST YEAR REP.



N.W.R. BOYES
1ST YEAR REP.

Freeland Toronto

The Industrial Chemical Club

This year the Club enjoyed the friendship of Mr. Buchan of Bakelite Corporation who was the Honorary-Chairman. Mr. Buchan is a graduate of School and still possesses that old spirit.

The annual trip to Buffalo was well received by the third and fourth year members of the Club. Three plants were visited *en route* and all visits proved very successful. Proctor and Gamble spared no effort in showing the fellows through their plant and they finished off the trip with an excellent dinner. In the afternoon, the group split up, one half going to the Alliance Paper Co., and the other half to the Ontario Paper Mills. It was indeed a treat to see the old spruce logs come in at one end of the mill and see the fine printing paper, newspaper and glassine leave at the other end. The process was interesting and the tours were well conducted. As usual, everyone met again in Buffalo and had a wild old time.

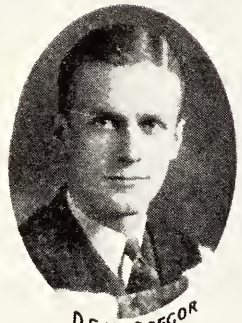
Last year the supper meetings met with such success that it was decided to continue them. Johns-Manville was the first guest to address the club. Their film "Heat" was interesting and the many question asked by those present following its showing, indicated the manner in which it was received.

The November meeting was unique in that we had both good entertainment and a good speaker. The entertainment was supplied by members of the fourth year who put on a skit worthy of School Nite. Mr. Buchan brought along an English film on the manufacture of numerous uses of Bakelite. It was well planned and informative, and resulted in a very profitable evening.

The high standard of talks was maintained if not outdone, by Professor Allcut at the December meeting. His talk on "The Properties of Heat Insulating Materials" was given in his characteristic manner. It included much of his own research work and some of his results were truly startling, even to a Chemical. Everyone was agreed that Professor Allcut was welcome back anytime he found it possible to address the Club again.

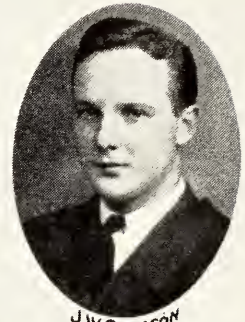
Our first non-technical subject of the year was an address by Mr. Wright, who spoke on "You Have Your B.A.Sc., So What?" No speaker who has visited the Club held the attention of the fellows the same way that Mr. Wright did. He was humorous, witty and serious, giving many sound words of advice to the up and coming graduates. GEORGE KENNEDY, *Chairman.*

R.K. PILE
SEC.-TREAS.

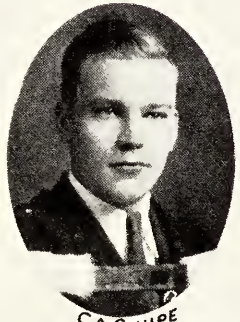


D.E. McGREGOR
CHAIRMAN

PROF. H.W. PRICE
HON. CHAIRMAN

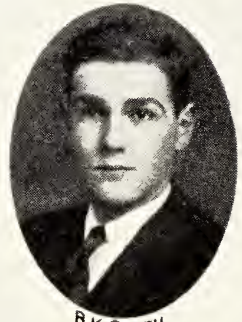


J.W. SIMPSON
VICE-CHAIRMAN



C.A. SHUPE
4TH YEAR REP.

ELECTRICAL CLUB EXECUTIVE

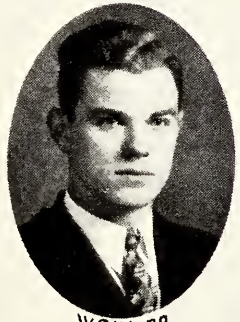


B.K. SMITH
3RD YEAR REP.

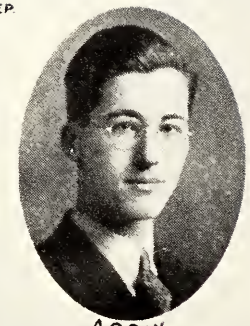
Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

1939-1940



W.C. WARD
2ND YEAR REP.



A.G. DAY
1ST YEAR REP.

Freeland Toronto

Electrical Club

The Electrical has had another active and successful year. The meetings were well attended and helped a good deal to foster inter-year acquaintanceships which are the primary object of the club.

Our first smoker, which was held shortly after school opened, took the form of a "double feature". Professor Loudon gave a very interesting address on "The Engineer and the Army" in which he outlined how an engineer entering the army might use his training to best advantage, and Professor Cass-Beggs, who survived the *Athenia* disaster, related his experiences aboard the ill-fated vessel.

In late October, the Club made a trip to the Dunlap Observatory, where Professor R. K. Young showed us the details and operation of the large telescope used for meteorological work. Although it was a poor night for observations there was plenty to see besides stars and we all enjoyed our visit.

Mr. J. W. Bateman of Canadian General Electric spoke on "Recent Improvements in Lighting" at the December smoker and gave practical demonstrations of the many new lamps. In January, Mr. Henry Parker gave us a most entertaining address on "Inspirations in Radio".

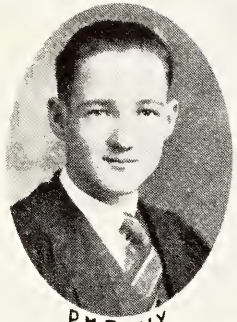
This year's dance on December 4th, at the Arcadian, in which the Mechanicals and Engineering Physicists joined with us, was a rousing success and probably will be repeated in future years. We were a little too noisy, perhaps, to suit the radio announcer but it was our party, not his.

The bowling night, which seems destined to become an annual event, was again a most successful evening and served to get the various years together, bowlers and non-bowlers alike. Some of us had trouble making 100, but it was a lot of fun.

Our closing smoker featured an illustrated talk by Gord McHenry of fourth year, who spoke on "Boulder Dam". As an added feature on this program a sound film entitled "They Discovered America" was shown through the courtesy of the Gray Coach Lines.

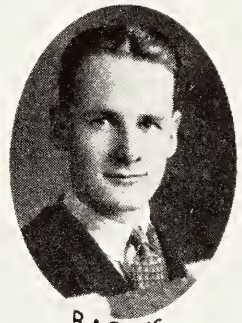
In closing may we thank the executive and members for their fine co-operation, without which a successful year would have been impossible. It is to be hoped that in future years the club will continue to receive the active support of all its members.

D. E. McGregor, *Chairman.*

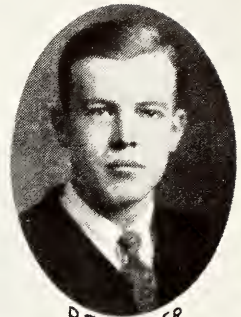


P. M. REILLY
VICE-PRESIDENT

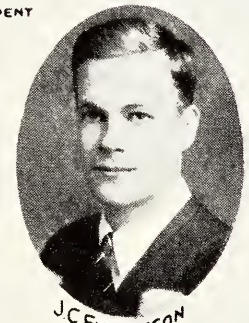
PROF. ALLCUT
HON. CHAIRMAN



R. A. GREIG
CHAIRMAN



P. E. PASHLER
SEC.-TREAS.



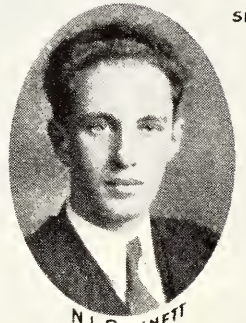
J. C. FINLAYSON
4TH YEAR REP.

DEBATING CLUB EXECUTIVE

Faculty of Applied Science and Engineering

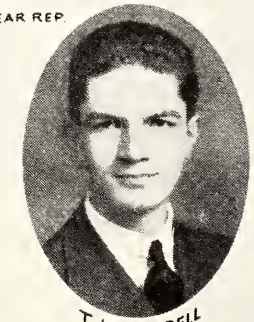
UNIVERSITY OF TORORTO

1939-1940



N. L. BENNETT
3RD YEAR REP.

A. B. EXTENCE
2ND YEAR REP.



T. J. CAMPBELL
1ST YEAR REP.

Graeland. Toronto

S.P.S. Debates Club

This club is for the purpose of carrying on organized discusssion, debating, and public speaking in the faculty. Its executive is elected by the undergraduates of the faculty at the annual spring elections. The policy of the club is made by this executive, based on the regulations as laid down in the "Constitution and By-Laws of the U. of T. Engineering Society" as revised March 1, 1937.

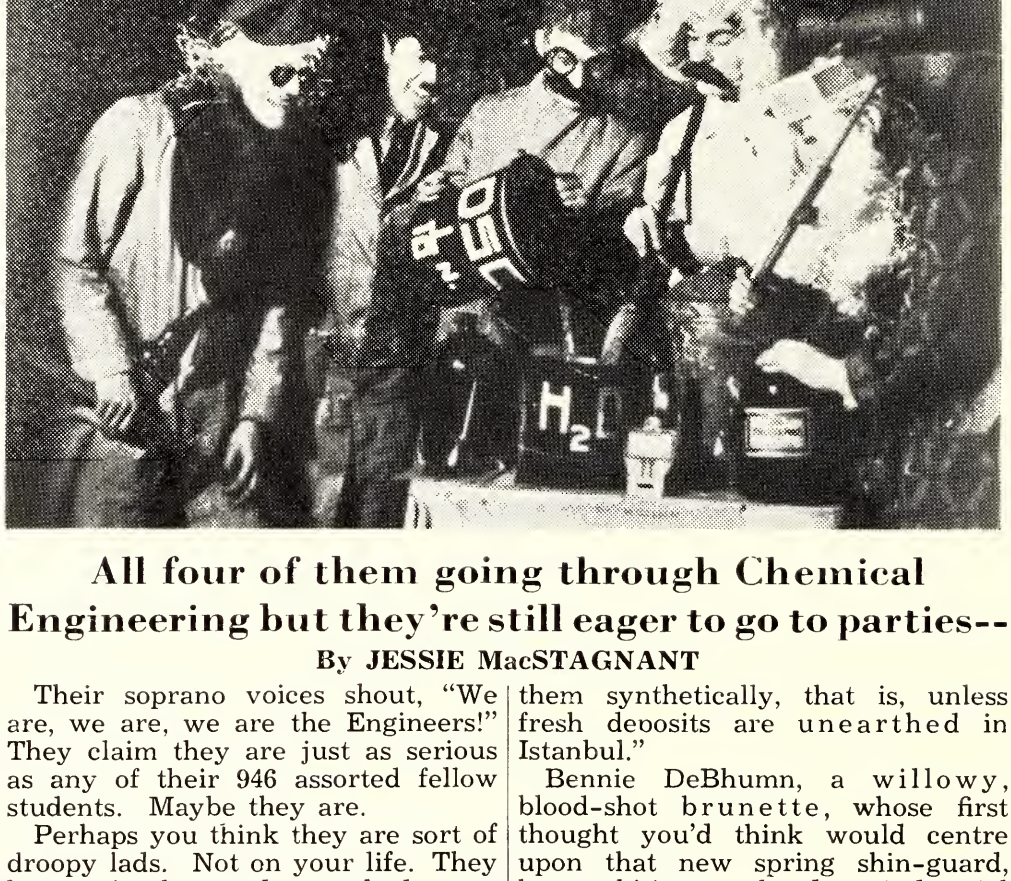
Looking over the club transactions during the Fall and Spring terms, a certain variety strikes us. There was the "Mock Trial of Hitler", when Ed. Pashler combed his hair diagonally across his forehead and went on trial as wild-man Hitler. Kelk and "Mayn" Bleaken dug up the information that a very large majority of college-trained presidents of industries were graduates in technical training. The public speaking contest was given a laugh when Jack Williamson couldn't make up his mind as to the selection of subjects. The club arranged for Mr. Jeff Rowat, General Sales Manager, Canadian SKF Co., to speak on "Selling as a Profession". He emphasized success from better expression of ideas.

On strict debates, the first Segsworth Debate, between Third and Fourth years on whether there should be girls in S.P.S., was taken by Third year who thought girls were a good thing. The second Debate in the series was a tug-of-war between First and Second years on the question of more practical instruction at college. Jack Ames and Jack Stirling won the Segsworth trophy for the Third year.

Every year, the E.I.C. holds an annual student's night at which undergraduates present essays on some technical subject for cash prizes. If the entry list is greater than six, the Debates Club undertakes to run off a preliminary competition to determine the six who enter the E.I.C. competition.

In the future, it may be possible to organize the club so that the membership is by fee and each member is elected by the club members to the organization. An undergraduate in the faculty is open to membership if actively interested. Also, our organization each year should provide a speaker to the General Engineering Society Meeting on a subject in keeping with the aims of the club.

Rowed Greig, *Chairman.*



All four of them going through Chemical Engineering but they're still eager to go to parties--

By JESSIE MacSTAGNANT

Their soprano voices shout, "We are, we are, we are the Engineers!" They claim they are just as serious as any of their 946 assorted fellow students. Maybe they are.

Perhaps you think they are sort of droopy lads. Not on your life. They have pimples and scorched eyelashes, will pop into an evening suit on a moment's notice as quickly as the next one, and greet with horror the idea that maybe in a girl's faculty they should take themselves to dances.

"We're just like any other boys—we wait for an invitation," explained pretty Algernon Fippendurp.

Not There for Fun

The boys are not there for fun. They look like any four frosh from a mental institution. But the love of five foot tall Percival Bgykphioq (nationality ?) is a steam-heated mouse trap. He tried to invent one once. He still thinks he can put it over.

"And how about you?" we asked another emaciated but alluring pint size, Herman Hormoane.

"Research," he squeeked. "Research." Look at all the ice-cubes that are used in daily consumption; when I graduate I want to develop them synthetically, that is, unless fresh deposits are unearthed in Istanbul."

Bennie DeBhumn, a willowy, blood-shot brunette, whose first thought you'd think would centre upon that new spring shin-guard, has ambitions to head an industrial chemical laboratory, and Izzy Izcwekowitz ("The All American Floy"), another typically movie version stooge, plans to devote his life to steal.

They all think the girls of S.P.S. are gentlemen. But sometimes they confessed they get lonely for more boys.

Can't Answer Why

"Now don't ask why we chose it," warned Algernon F.—"everyone always asks that; and nobody can ever answer."

But Bennie DeB. came forth with the suggestion that it was his choice because of a dare.

Percy P. said he had been awe-stricken when a child at watching a man oiling locomotives, and right then and there he decided to get his elementary training at S.P.S.

Amidst lusty but rather risqué yells, we presumed Engineers Songs, we ended the interview.

sPs
sPs
sPs
sPs

sPs

sPs

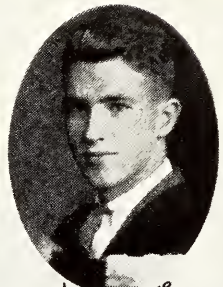
DON. PARRISH

F.F.WALSH
PUBLICITY

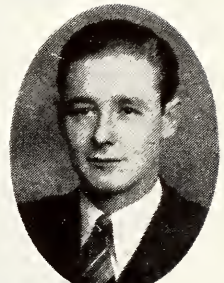
W.E.K.BROWN
FINANCE

S.D.TURNER
CHAIRMAN

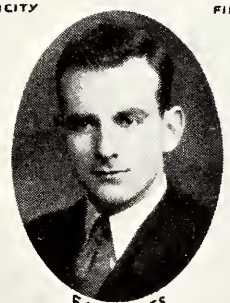
S.M.S.DUNN
PRESIDENT
ENG. SOC.



J.D.GARDINER
VICE-CHAIRMAN



H.L.FOSTER
TICKETS



E.H.NOAKES
DECORATIONS

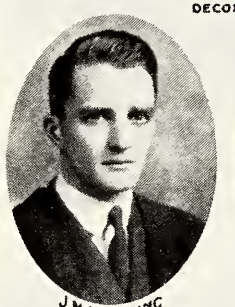
SCHOOL DINNER COMMITTEE

Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

1939-1940

F.C.T.ROUNTHWAITE
PROGRAMMES



J.M.HARDING
ACCOMMODATION

W.K.CLAWSON
MARSHALLING

G.B.McKENDRICK
ENTERTAINMENT

M.A.CREET
RECEPTION

50th Annual School Dinner

On the evening of November 23rd, 1939, there took place, in the medieval atmosphere of the Great Hall, an event of singular interest to every Schoolman. In response to a fanfare of previous publicity the clans gathered for the Golden Jubilee of the Annual School Dinner. The gay, crowded tables, filled with undergraduates, graduates, professors and guests, once again sagged beneath a sumptuous repast, replete with the traditional king of fowl and his culinary court. For the first time in history, the ladies graced the assembled host with their presence.

When the noise had subsided, the honored guests were introduced. These included such notables as Sir William Mulock, the Hon. C. D. Howe, Dr. D. C. Jackson, President Cody, Dr. T. Hogg, Dr. Berry, Dean Mitchell, Dean Beatty, Professor C. H. C. Wright (who has never missed a School Dinner) and many others of distinction.

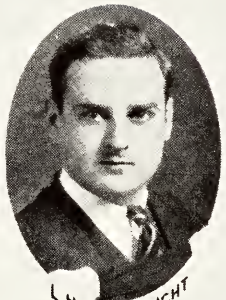
President Cody replied to the toast to the University, and Sir William presented the Gold Keys of the Engineering Society to the favored few. The "brain trust" then proudly marched to the fore to receive their scholarships from the hand of Dr. Jackson, an eminent engineer from "south of the border".

Dean Mitchell, in answering the toast to School, literally rose to the heights, by delivering his humorous and philosophical address on an engineer's life at school, from the table top.

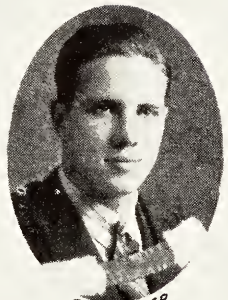
Between the entertainment provided by famous stars of radio and screen, as impersonated by Joe Murphy, and that of Lou Skuce, one of the best cartoonists in the business, Dr. Hogg presented the Athletic Association Gold Keys to the various "musclemen" of School.

The Hon. C. D. Howe, Minister of Transport in the Federal Cabinet, a graduate engineer, and guest of honor, then rose and spoke on the very timely subject of "Preparedness and Transportation". In discussing the Canadian war program, he stressed the assurance that the absence of frantic endeavor and confusion was the best possible evidence that the country had been prepared both offensively and defensively, long before the outbreak of war. He pointed out that industrially, economically, and with regard to transport by air, rail, and water, Canada was in a far better position relatively, than at the beginning of the Great War. The whole address was very informative, and pertinent.

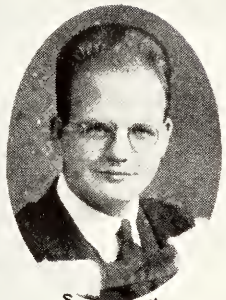
W. E. K. BROWN
FINANCE



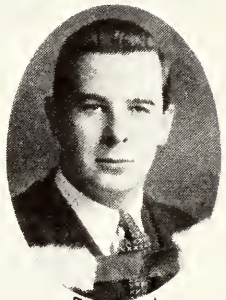
L. H. G. KORTRIGHT
VICE-CHAIRMAN



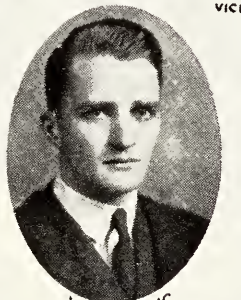
S. D. TURNER
CHAIRMAN



S. M. S. DUNN
PRESIDENT



F. F. WALSH
PUBLICITY



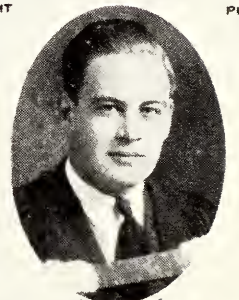
J. M. HARDING
TICKET SALES

SCHOOL AT-HOME COMMITTEE

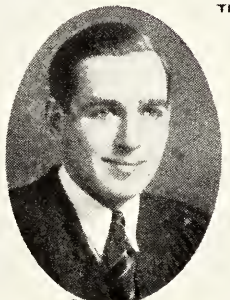
Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

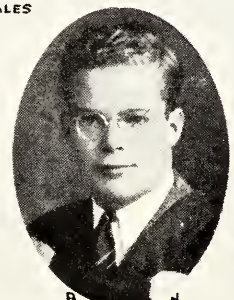
1939-1940



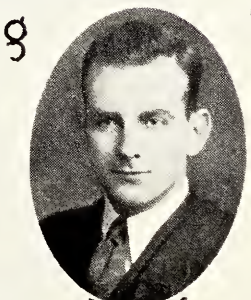
J. D. BRYCE
RECEPTION



B. L. DAVIS
ACCOMMODATION



B. H. M. TEDMAN
DECORATIONS



E. H. NOAKES
PROGRAMMES

H. J. M. BUTTERILL
DELEGATES

School At-Home

The School At-Home was held on January nineteenth, nineteen hundred and forty. The scene of this annual party was the Concert Hall of the Royal York Hotel, where close to one thousand happy persons danced merrily to the music of Bob Shuttleworth and his thirteen piece orchestra. Pat Bailey, in her own charming manner, took care of the vocal refrains.

At three o'clock in the morning, when they'd danced the whole night through, everybody was having such a wonderful time that they decided it was too early to start home, so arrangements were made to extend the dancing to the wee small hour of four a.m.

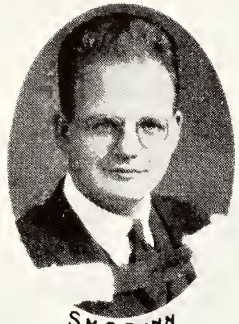
The Concert Hall was decorated in a style that carried out the motif of a true Engineering At-Home. Large murals depicting engineering feats were made under the direction of that versatile architect, Blake Tedman, and placed in the window recesses they were effectively illuminated. These murals, as well as the actual working displays designed and built by the Electrical, Mechanical and Chemical departments, with much coloured lighting of the Hall, provided a suitable setting for a true School party.

At 10.45 p.m., the School At-Home went on the air for fifteen minutes over the CBC nationwide network across Canada. The broadcast opened with a fanfare by the orchestra, breaking into a medley of college songs in which everyone joined in chorus and followed with college cheers. Syd Dunn, President of the Engineering Society, extended a greeting to all graduates of the University with special salutations to those from S.P.S.

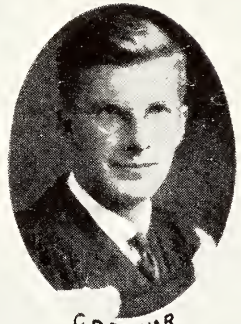
Shortly after the broadcast, the first half of a ten-act floor show entertained the engineers and their lassies to a variety program. The second group of five acts came on the floor following the intermission, after which the evening's program was effectively filled with merry-making and dancing. Four o'clock rolled quickly round and the At-Home ended its most successful party.

Patronesses of the evening were: Mrs. H. J. Cody, Mrs. C. H. Mitchell, Mrs. R. W. Angus, Mrs. J. W. Bain, Mrs. H. H. Madill, Mrs. T. R. Loudon, Mrs. G. A. Guess, Mrs. A. R. Zimmer, Mrs. C. G. Williams, Mrs. W. J. T. Wright, Mrs. R. R. McLaughlin, and Mrs. W. S. Wilson.

G. B. McKENDRICK
VICE-CHAIRMAN



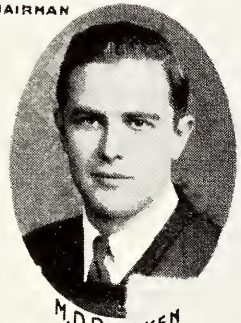
S. M. S. DUNN
PRESIDENT



G. P. DEWAR
CHAIRMAN

W. E. K. BROWN
FINANCE

F. F. WALSH
PUBLICITY



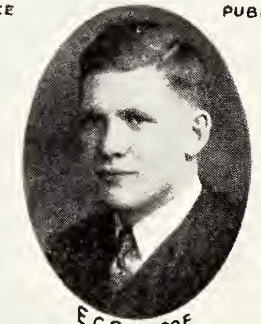
M. D. BLEAKEN
RECEPTION

SCHOOL NITE COMMITTEE

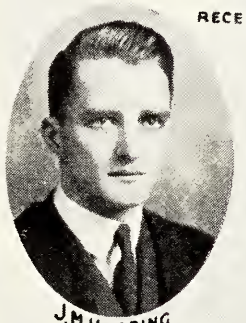
Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

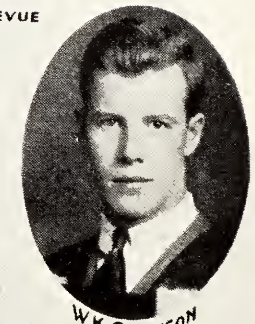
1939-1940



E. C. BRISCOE
REVUE



J. M. HARDING
TICKET SALES



W. K. CLAWSON
ACCOMMODATION

FREELAND STUDIO
TORONTO

School Nite

"The best in twenty years", "The music was perfect", "What a Show!". These and other comments were heard on every hand from Faculty and students alike as the great night drew to a close. This year, School Nite broke all records in every department. The setting was once again the spacious and gaily decorated Hart House. Nearly a thousand couples enjoyed the best annual informal affair around these parts.

The Revue started things off with a performance seldom equalled on the legitimate stage. The orchestra, composed solely of Engineers and directed by Park Merrifield, "Glen Millered", "In the Mood", "She Had To Go and Lose It At the Astor" and other original tunes by Tommy Watson, Syd Dunn, and Bill Brisco. The audience, who occupied the aisles in preference to their seats most of the evening, were both loud and long in expressing their appreciation especially of the Fashion Show, the like of which has never been seen in Canada. Probably to compete with local theatres, lucky prizes were distributed at each performance. At the Second Show, Dean Mitchell was lucky enough to be the recipient of a brand new, large sized shovel. During the evening he expressed his determination to really use it in the days to come. Sure enough, in the next edition of Toike Oike, the Dean wrote an article entitled "Spades, Scoops and Shovels". Bill Brisco who wrote, produced, and directed this year's Revue, certainly can "take a bow" on this account.

After the show, dancing was enjoyed in the big gym and elsewhere to the syncopation of Richard Avonde, Lloyd Kerr, Mel Hammill and the Commodores. This quartet catered to all with lilting waltzes and "hep-cat Jive" mingled with dances such as the popular "Coki-Oki". And she was a perfect dancer! What else could one ask?

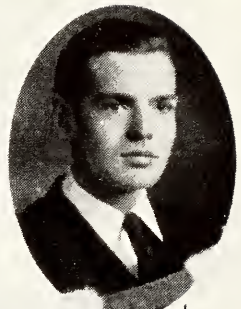
School Nite was graced this year by the patronage of Mrs. H. J. Cody, Mrs. C. H. Mitchell, Mrs. R. W. Angus, Mrs. J. W. Bain, Mrs. G. A. Guess, Mrs. T. R. Loudon, Mrs. C. G. Williams, Mrs C. R. Young, Mrs. G. B. Langford and Miss Marion Price.

Next year's School Nite Committee have a real goal to shoot for—and that is, an evening as enjoyable as that provided by this year's committee. Congratulations, School Nite Committee!

H. G. STARK
ASSISTANT EDITOR

J. B. HALL
EDITOR

F. F. WALSH
DIRECTOR OF PUBLICATIONS AND PUBLICITY



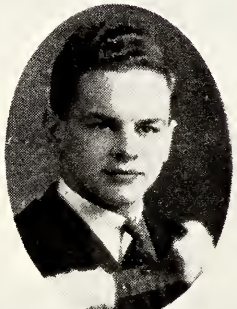
C. M. MITCHELL
FEATURE EDITOR

TOIKE OIKE STAFF

Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

1939-1940



J. L. BRISLEY
SPORTOIKE

Freeland Toronto

K. H. KIDD
HUMOUR

Toike Oike

"Devoted to the interests of the Undergraduates of the Faculty of Applied Science, published every now and then by the Engineering Society of the University of Toronto", Toike Oike has again faithfully presaged every major social event of the Schoolman's year. The Freshman Edition contained helpful directions for the First Year men on the opening day of the term. The Reception Edition, directed to the Frosh as much as the Freshmen Edition, was more helpful to the Sophs. A special twelve-page paper was published on the occasion of the Engineering Alumni Triennial Reunion, with the aid of the Reunion Committee. Toike Oike again appeared for School Dinner, and Christmas Vacation was the reason for the fifth issue. A news edition was published next, and School At-Home provided the copy. The School Nite Edition, in blue and gold, with an innovation in the form of a Revue Program, was useful and entertaining. Election Edition early in March gave all candidates the opportunity of extolling their virtues, or a way of getting their names into print. A few days after the elections, the Graduation Edition, on the occasion of the Grad Ball, optimistically finished activities.

A decided improvement in the paper this year was the addition of a regular column, entitled "From Behind Closed Doors". These articles, written by the Director of Publications and Publicity, were devoted solely to the dissemination, among the Engineering Society members as a whole, of facts relating to the activities and plans of the Executive. It is hoped that this service will continue in years to come. The "Sport Oike" column was a regular feature as it has been in other years, with news of School's victories and set-backs, with the occasional pep talk. Due to slight deficiencies in space, time, higher education, and lower education, hoped-for improvements such as a regular technological column of serious or humorous nature did not materialize. The hope for this opportunity we bequeath to our successor with our blessing.

Thanks are especially due to Dean Mitchell for the time and effort spent in preparing very valuable contributions to nearly every issue. We are also grateful to Fred Walsh and to the various club chairmen for the good work in "every once in a while".

J. B. Hall,
Editor.

GULL LAKE SURVEY CAMP

Survey Camp 1939

It was on the 15th of August (approximately) that some 50-odd miners and civils, fresh from the mines and roads of this far-flung domain, drove everything from cows to Packards to jallopies across the bumpy roads leading to the U. of T. Survey Camp. They came in twos and threes, like sheep to the fold athirst for more knowledge of levels, transits, tapes and chains —and some came just athirst! Baggage unloaded, and stalls selected, they returned immediately to fair Minden for canoes, liquid refreshment, and sundry paraphernalia for better hunting about the shores of Gull Lake.

To the chagrin of all, it was disclosed that duties as surveyors were to become effective immediately, and the boys, being easy to get along with, began running boundaries, lake traverses, driving tunnels, determining the age of dikes, and granites, and calculating with slide rules and logs the position of the North Star, although everyone knows where it is anyway.

Many enjoyable evenings were spent in Minden's sumptuous hotel in the eternal pursuit of happiness. Here were enacted many amusing and carefree events, climaxed on that last evening by a record-breaking tidal wave. Following such visits to town there were always "carryings-on" in the bunkhouse—Burke turned athlete, and with the help of several wash basins tried his hand at discus throwing; Johnson, with the unerring eye of ol' Diz, cigarred the water cooler one night; Miller got ornery once and uncorked a vicious left at the expense of a burning Mazda; Rose still doesn't know why he awoke one morning with his bathing suit on.

During the day the woods and hills rang with the cries of "working men". There was Taylor bellowing for his party to hold their rods straight. Short-sighted Moose Boultbee's plaintive cry, "It's a Moose", as Minto's cow was scared off into the bush once more; Burk's, "How would you like to hold this straight", as he grasped his theodolite, etc., etc.

"Pop" Minto made history at 2 a.m. as he stood dripping beneath the recently emptied bucket hanging from the back door and eloquently spoke, "I can have the Provincial Police down here in 10 minutes. You're all a bunch of hoodlums; it's the same every year." And all we were doing was "singing".

We couldn't help laughing when Lambe sat on that hornet's

nest—all land speed records were broken as he hit the lake. Then there was that impromptu 3 a.m. rugby game staged in the bunkhouse with neither rules nor referees—followed by a barn dance—wotta night!

We will all remember rather vividly the Bunkhouse Dance when "a whole truckload of girls" under Warner's auspices arrived to make the evening a howling success.

Many mysteries could be cleared up, for instance—Who rolled that rock through the pumphouse?—Who knows anything about a broken window?—Who put the Minto's boat in that certain little house?—Who put whose bed in the lake?—Who put that snake in Robinson's bed?—Who put who, etc., etc.

But this couldn't go on for ever, and one fine day, late in September, we all piled into our Packards and jallopies again to return to the sane life of the city, as some people say, and Survey Camp became a happy memory—to some.

Yes, Survey Camp is an Institution that should be looked forward to by all those 4T2 miners and civils. And you can say that again!

GRADUATE'S ALBUM

4 T 0

ENGINEERING SOCIETY

THE UNIVERSITY OF TORONTO

FOURTH YEAR

CIVILS

Back Row: E. E. Hart, J. O. S. Smith, W. G. Grier, R. A. Forrester, D. E. Kennedy, F. W. Shaw, S J. Simons, R K. MacKenzie.
Front Row: J. B. Moore, Prof. W. J. Smither, Prof. C. R. Young, W. K. Clawson, Prof. W. M. Treadgold, J. D. Near, A. W. Wardell.

METALLURGISTS

MINERS

Eighth Row: Prof. Newcombe, J. M. King, L. R. Wood, R. N. West, E. G. Dunlop, W. A. Semple, J. C. Copeland, J. M. C. Greer.
Seventh Row: W. L. Courtney, H. A. Skelton, J. K. MacFarlane, J. R. Scrivener, R. C. Vincent, R. F. Davis.
Sixth Row: F. W. A. Baulch, M. D. Bleaken, J. T. Hughson, A. O. A. Vale, T. R. B. Watson, J. H. Fisher, J. A. Murray, F. G. Brown, G. F. Kirby, G. M. Scott.
Fifth Row: A. B. McAdam, B. M. Middleton, W. S. Thompson, N. Kneeshaw, G. H. R. Mearce, K. M. MacQuarrie, W. H. O. McLaren, E. T. Galway, R. E. Alden, M. J. Taylor.
Fourth Row: A. L. Johnston, J. W. Murray, H. B. Amey, H. E. Rudd, W. E. Cavell, Y. H. Williamson, L. M. Sebert, A. F. Raney, N. J. Thompson, S. M. S. Dunn, G. F. Martin.
Third Row: T. P. J. Callon, W. C. Schwenger, J. D. Bryce, J. L. S. Ross, E. B. Wilson, J. E. Williamson, D. S. Morse, W. B. Sinclair, J. E. Isbester, A. K. Douglass, G. A. Renshaw, J. F. S. Bolton.
Second Row: Mr. McLaren, P. J. McCabe, S. R. Knott, H. S. Wainberg, H. P. Wilson, N. A. Creet, A. G. Gillespie, R. B. Brackin, F. L. Beggs, A. F. I. Garcia, G. B. Wood.
Front Row: Mr. McMurray, Mr. Jennings, Mr. Turrall, Prof. King, Prof. Williams, Prof. Guess, Miss Bradshaw, Mr. Wolfe, Miss Tully, Mr. Hewer, Prof. Moore, Prof. Langford.

FOURTH YEAR MECHANICALS

Front Row: A. R. Dawson, J. M. VanWinckle, Mr. R. C. Wiren, Prof. E. A. Allcut, Prof. R. W. Angus, Prof. R. Taylor, Prof. W. G. McIntosh, Prof. G. R. Lord, L. A. Patterson.

Second Row: F. F. Walsh, A. B. Ballagh, J. D. Clarkson, W. F. Woodley, L. Cohen, G. E. Stanway, J. C. Finlayson, D. R. Tennent, E. Myatt.

Third Row: F. D. Ledgett, J. R. Michie, J. D. Mitchell, E. F. Thompson, J. D. Gardiner, R. A. Greig, C. W. McEwen, J. J. Brown, F. G. Murphy.

Back Row: C. E. P. Mudie, M. B. Nesbitt, D. C. Jennings, F. H. Howard, J. I. M. Williamson, R. C. Day, A. W. Fergus, J. J. Pigott, E. A. Clifford.

FOURTH & FIFTH

ARCHITECTS

Back Row: Professor E. A. Arthur, Professor H. H. Madill, Mr. M. Waters.
Front Row: P. M. Keenleyside, E. H. Noakes, B. H. M. Tedman, S. B. Barclay, W. T. Siu.

ENGINEERING

PHYSICISTS

Back Row: Professor Burton, Professor Gilchrist, Professor C. R. Young, E. P. Bridgland, Professor Satterly, Professor Smith, Professor Jackson, Professor Loudon.

Front row: J. Brisley, R. Whitelaw, H. G. Stark, A. Black, C. M. Mitchell, J. B. Hall, G. Piper, G. Flagler.

FOURTH YEAR CHEMICALS

Front Row: Prof. E. A. Smith, Prof. E. G. R. Ardagh, Prof. J. W. Bain, Prof. M. C. Boswell, Prof. R. R. McLaughlin.
Second Row: B. E. Dawe, Mr. N. Fasken, M.A.Sc., W. E. Patte, W. P. Fry.
Third Row: T. M. Kingsbury, N. L. J. Mould, G. Kennedy, J. R. Rodzik, W. M. Karn, E. B. Trickey, J. A. B. Milne, G. I. P. Wheaton.
Fourth Row: B. A. B. Clarke, W. G. B. Carson, R. G. Billinghurst, J. B. MacMillan, W. G. Belfry, K. A. J. Ramsay, C. H. Wastle, H. R. Green, D. Richardson.
Fifth Row: D. H. Welch, Q. R. Ball, W. D. McLean, E. B. Potter, F. C. D. Wilkes, G. P. Lugsdin, J. G. Lucas, D. F. Hutton, M. C. Robinson.
Sixth Row: W. D. Dawson, D. Y. Ferguson, H. M. Lyon, W. G. MacElhinney, S. M. Jones, Dr. J. G. Breckenridge, Dr. G. P. Beale.
Seventh Row: G. P. Dewar, J. M. MacLeod, G. B. McKendrick, L. Franchetto, L. K. Greenop, Mr. B. E. Marks, B.A.Sc.
Eighth Row: Mr. M. Adelman, B.A.Sc., Mr. A. M. Fitzgerald, Mr. A. S. Weatherburn, M.A.Sc.

FOURTH YEAR ELECTRICALS

Front Row: Mr. Cass-Beggs, Mr. J. E. Reid, Professor V. G. Smith, Professor B. deF. Bayly, Professor H. W. Price, Professor A. R. Zimmer, Mr. R. J. Brown, Mr. L. S. Lauchland.
Second Row: E. J. Apps, H. B. Muckle, J. W. Newby, I. W. M. Martin, G. M. McHenry, D. R. B. McArthur, D. E. McGregor, J. C. Cline.
Third Row: H. M. Reid, W. P. Patterson, C. A. Shupe, T. J. McQuaid, W. H. Meyer, D. W. Patterson, W. L. Phoenix, W. G. Murray.
Fourth Row: N. J. Norris, H. K. Wightman, N. D. Lindsay, H. J. Murphy, L. K. Hart, E. G. Bainbridge, H. W. Elliot, S. D. Turner, A. F. McLean, M. K. Strang, F. N. Beattie.

Class of 4T3

Now that 4T3 has worked at learning for nigh on seven months, we believe with good cause, we might turn to something else. Let us see what Wordsworth says:

"Up, up, my friends and quit your books,
.....
One impulse from a vernal wood
Will teach you more of man,
Of moral evil, and of good,
Than all the sages can."

Of man,—of moral evil,—of good. How well this comprises what we strive for in our lives; Combined with good sound academic training, it will lend us the key to success.

Our School term ending in April is merely the completion of one small chapter in our pursuit of knowledge, which we hope will carry us forward into an ever-widening field of enjoyable work throughout our course of study, and eventually to remunerative positions in our chosen professions.

During the course of our school year we have played as well as worked together. With the Soph-Frosh and the Junior-Soph-Frosh we proved our ability to rub shoulders with the more learned of our fellow students, and at our own year dances we had a "good time" on our own.

What with these functions and making a showing for 4T3 in the various sports enterprises, we are agreed that our year has been a success socially. (May the powers-that-be grant that it may also be a success academically!)

We would like to take this opportunity to thank Bob Scott for so ably taking care of our financial and secretarial worries, and Rod Ritchie for his unrelenting efforts with the over-worked Fatigue Duty Squad.

Now, with initiation in the dim and distant past, and ominous rumblings of impending examinations already audible in the immediate future, we come to the realization that our Frosh year is over. We hope that your memories of it are as vivid and happy as those we take with us.

May we all be sophs next year!

Jim Cawley,
President 4T3.

Class of 4T2

With such grim determination and willingness did we return to school this fall to make Schoolmen out of the horde which registered in first year. There was a storm brewing in our chests to be let loose with all its fury upon the innocent frosh. But alas, the conditions of the time made us fight a battle of restraint rather than one of eggs and flour. We made the best of our position, and school authorities can proudly say that 4T2 did its part in making the small sacrifices asked of students in war time. Of course, some of the frosh may have bathed frequently in the garbage cans, but they needed the wash.

The freshman reception held at Hart Hourse afforded our first official contact with the frosh. They put on a little show for us—what a show! If any of the professors saw themselves portrayed by the freshmen, the 4T3 exam results are going to be pretty sorry looking things.

During the fun and food, however, we found that the frosh were not such a bad bunch after all.

Our first social fling took place at the Royal York, where the Soph-Frosh dance was held. Bert Niosi beat it out for us, and after four hours of hot jive most of us were on the receiving end of the beating. They tell me that all the apparatus in the Chem lab was broken next day by the boys trying to imitate that drummer.

Just before Christmas we had our year dance in conjunction with third year. It took place at the Arcadian, where Eddie Stroud played for us. Good? You can say that again! It just put us in the mood for Christmas gong kicking.

The Junior-Soph-Frosh in the spring, nicely rounded off our social year. Again the Royal York resounded to Toike Oike. As a contrast to Bert Niosi, Jo De Courcy gave us some sweet dance music. Then, the day after the Junior-Soph-Frosh we pawned our dancing shoes and got down to work, at least, we wish we had.

Despite the small sale of year cards this year, our bank account was substantially increased. Oh happy day! In fact, from all angles, the future looks rosy for 4T2.

Good luck to the incoming executive, in guiding a year which is well worth working for.

B. O. Dick,
President.

Class of 4T1

Yes, here we were back at school again, and boy, oh boy, were we looking forward to the joys of at last watching a Soph-Frosh flag rush. But alas, we were due for disappointment. The year the war is over and the old tomato fight is resumed will be just like reunion for 4T1.

It wasn't long after we arrived as Juniors that the year cards put in their appearance, and the battle was on. The Executive won, and immediately jumped into the fray to give the boys of 4T1 some social events that they won't soon forget. (We hope.)

At our first party we joined in the Soph-Frosh, and helped the second year show the Freshmen how college men celebrate. Bert Niosi furnished the music, C.P.R. the Hotel, and various firms and individuals, the traditional forty beers.

Shortly after that historically famous School Dinner, we set a precedent for year parties by taking our Christmas Dance to Eddie Stroud at the Arcadian. This was one swell dance, with the tables differently arranged in two-somes, three-somes, or what have you? And what is more, for the first time we had enough good punch.

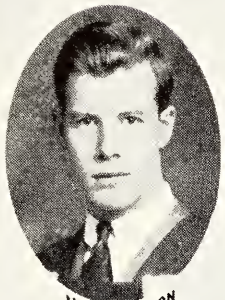
After Christmas the School was humming with preparation for the big Annual School At-Home which took place on January 19th. The effects of this supper party lasted until early in February when along come the inevitably successful School Nite.

Later in February we took the Sophomore class in tow and held a joint year party at the Arcadian.

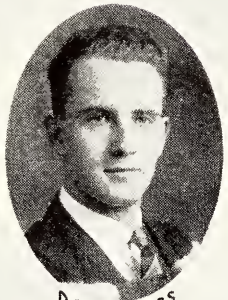
Ah yes, here it comes. Early in March we held the Junior Soph-Frosh Prom at the Royal York Hotel, but what held us?—Nothing! It was our last party of the social season, and jubilant laughter could be heard in the Concert Hall until far into the night,—and in various other parts, still later. Incidentally, the Hotel is still looking for a pair of missing door hinges.

The executive is very grateful to the year for the fine support and know that with the incoming executive we can expect a fine graduation year.

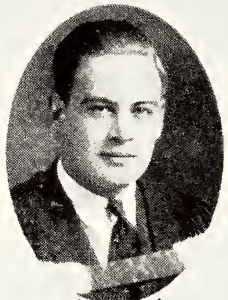
Bruce L. Davis,
President.



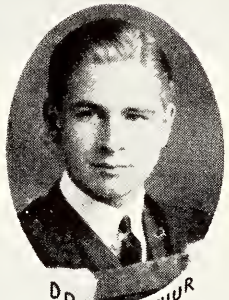
W. K. CLAWSON
CIVIL CLUB REP.



D. C. JENNINGS
ATHLETIC REP.

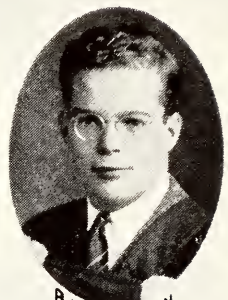


J. D. BRYCE
VICE-PRESIDENT

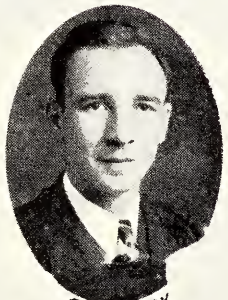


D. R. B. McARTHUR
PRESIDENT

Y. H. WILLIAMSON
SEC.-TREAS.



B. H. M. TEDMAN
ARCHITECTURAL CLUB REP.



G. KENNEDY
CHEMICAL CLUB REP.

FOURTH YEAR EXECUTIVE

Faculty of Applied Science and Engineering

D. E. McGREGOR
ELECTRICAL CLUB REP.

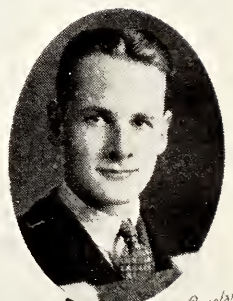
UNIVERSITY OF TORONTO

1939-1940

J. F. S. BOLTON
MINING & METALLURGICAL CLUB REP.

L. A. PATTERSON
MECHANICAL CLUB REP.

H. G. STARK
ENGINEERING PHYSICS CLUB REP.



R. A. GREIG
DEBATES REP.

Greeland Toronto

Class of 4T0

Well, fellows, it's four years since we first entered these portals to be greeted with a thundering roar from the Sophs. It's not hard to recall the ignominy, and later the pride, of wearing our green ties; and the skulking in and out of back doors on our way to lectures—we seldom skipped them in those days. Then came the elections when Jeep Dewar so ably took over the helm and organized our forces to vanquish the Sophs in a shower of tomatoes and flour at the Flag Rush. The Soph-Frosh dance, the highlight of the Fall parties, made our peace with the wrathful Sophs. The ballyhoo of School Dinner amazed us but the occasion fully lived up to all our advance expectations. We were now all Schoolmen, united by that intangible bond known as School Spirit. Our first School At-Home was the formal edition of the enthusiasm and sucess of the Soph-Frosh. Then the polished performances of School Nite culminated weeks of hard work on the part of many of our year. Then, before we realized it, the exams had crept up on us, and for a month we were lost to the world, only to emerge for one last get-together before scattering across the country for summer jobs.

Then came the good times of second year with Murray Scott at the controls, when we took over the role of Sophomores and made certain that the Frosh were endowed with sufficient School Spirit.

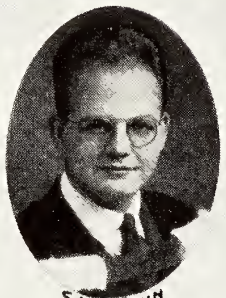
Fred Walsh guided us through the toils and tribulations of those three or four lab reports every week that spoiled many an evening in our third year.

Then came the long awaited fourth year with the uncertainty of the war and so many in the C.O.T.C. It is hard to realize that we are on the last lap, that we now fill the shoes of the Seniors who awed us in first year. Graduation week, with permanent executive elections, the Graduation Ball and Kipling Ritual, climaxed four years of work and play. We have our iron rings—we are engineers, except for some slight formalities in April. We have pulled together for four years, so let's support our permanent executive and stick together for years to come.

D. R. B. McArthur,
President, Class of 4T0.

J.D.BRYCE
COUNCILLOR

F.F.WALSH
VICE-PRESIDENT



S.M.S.DUNN
VICE-PRESIDENT

D.R.B.McARTHUR
PRESIDENT

W.K.CLAWSON
SEC-TREAS.

M.D.BLEAKEN
COUNCILLOR

S.J.SIMONS
COUNCILLOR

PERMANENT EXECUTIVE OF THE CLASS OF 40

Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

1939-1940

J.R.MICHIE
COUNCILLOR

G.M.McHENRY
COUNCILLOR

J.B.HALL
COUNCILLOR

C.KENNEDY
COUNCILLOR

B.H.M.TEDMAN
COUNCILLOR

Freeland
TORONTO

Permanent Executive 4T0

With the acrid smoke of the examination battle still in our nostrils, the Class of 4T0 has rather suddenly and sorrowfully awakened to the startling conclusion that School days are over.

From initiated to initiating, on through the Junior and Senior years, we have all made many close friends by working together, living together, playing on the same teams and entering into the same social activities. In addition, there belongs to us, one and all, the common heritage of graduating with the Class of 4T0. In electing the Permanent Executive, we have placed upon them the responsibility of cementing and strengthening the friendship and spirit fostered in our undergraduate days.

However, it is not solely on the Executive that this responsibility rests, for without the close co-operation of each member of the class, the task is hopeless. All the Executive can do is to co-ordinate the efforts of the individual members of the class. Hence, keep them informed and up-to-date in all matters concerning yourself; your location; your work; your health, etc. Address all location cards together with above information to the Secretary, Ken Clawson, and in this way the Executive will be able to keep a complete record of everyone in the class to be used by anyone in the class. The Executive is ready, willing, and able to supply you with any information that is available, or help you in any way it can. Through personal correspondence, by our own publications and by the University of Toronto Monthly, the Executive will be able to contact you frequently.

Once again the Executive urges you to co-operate with it and the University Alumni as a whole in preserving and maintaining the "spirit" and "tradition" of the Class of 4T0.

May the best of luck be yours in all you do throughout the coming years.

President: D. R. B. McArthur,
25 Willowbank Blvd.,
TORONTO. MO. 1423.

Secretary: W. K. Clawson,
96 Oakwood Ave.,
TORONTO. LI. 7751.

Graduation Ball

The ultimate in every Schoolman's social life comes with his Graduation Ball. On March 12th, this year, the great event was held in the Concert Hall of the Royal York Hotel amid scenes of gaiety and splendour which will always be remembered as the crowning glory of the lighter side of the history of 4T0.

Suave and smart in white ties and tails, the budding engineers set out to make their last official dance the best of all. The arrangements of the Committee had provided a fitting setting, the ladies provided beautiful company, and the engineers themselves created that robust atmosphere of friendly comradeship so intimately associated with all School's activities.

The stomp-and-slide rhythms of Bob Shuttleworth and his orchestra put the crowd in the groove, while his double-jointed drummer cast awesome and noisy spells at intervals. A good dinner was taken in stride and settled by further meanderings about the floor, and tired, but thoroughly happy, fourth year had another grand memory to take out for the edification of future generations.

SCHOOL ATHLETICS

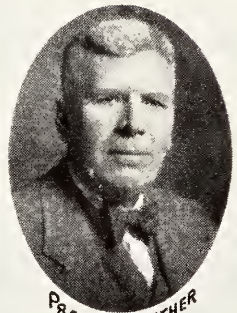
1940

ENGINEERING SOCIETY

THE UNIVERSITY OF TORONTO

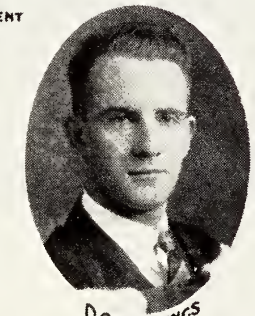
H. J. BARRETT
VICE-PRESIDENT

C. M. McHENRY
PRESIDENT



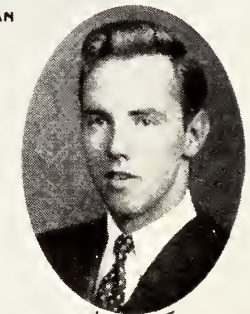
PROF. W. J. SMITHER
HON. CHAIRMAN

F. J. DOBSON
SEC.-TREAS.



D. C. JENNINGS
4TH YEAR REP.

ATHLETIC ASSOCIATION EXECUTIVE



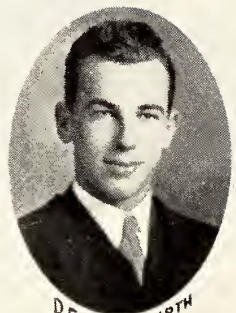
J. E. QUIST
2ND YEAR REP.

Faculty of Applied Science and Engineering

UNIVERSITY OF TORONTO

1939-1940

R. W. FUGLER
3RD YEAR REP.



D. E. GROSSKURTH
1ST YEAR REP.

S.P.S. Athletic Association

This faculty has always been justly proud of the calibre of its teams competing in the Intramural Sports schedule, and the number of Schoolmen in competition has increased until now there are upwards of three hundred striving to place "School" in the fore. The Athletic Forces of this Faculty have combined both quality and quantity to a degree that has, at times, caused grey hairs to appear on the heads of Athletic leaders of all other Faculties.

This year the ponderous machinery of the Athletic Association of S.P.S. gathered momentum very slowly, and School began the season well down the field of competition for the T. A. Reed Trophy. This may be partially attributed to the combination of very full timetables in this Faculty, with added hours spent in C.O.T.C. Service, in which a higher percentage of Schoolmen were active than men of other faculties. However, School gradually bettered its position as the year progressed until at this writing it is leading its closest competitor by some 400 points. Interfaculty Championships have been won in Rowing and Skiing Competition, and before the season is finished there may be more. In Hockey it is almost certain that the four S.P.S. teams will be fighting it out for the Interfaculty Championship, and will be the only teams in the final competition. In Basketball, and in Baseball, the teams from School are leading their groups and are all prospective Interfaculty Champs. The School Squash team tied for the Interfaculty Championship in this their first year of competition.

As usual, this Faculty has also been of service to the University in giving its share of men to Intercollegiate competition.

The Athletic Association would like to express its gratitude to the industrious "Mac" MacCutcheon, whose guiding hand ensures the life and success of the T. A. Reed Trophy competition.

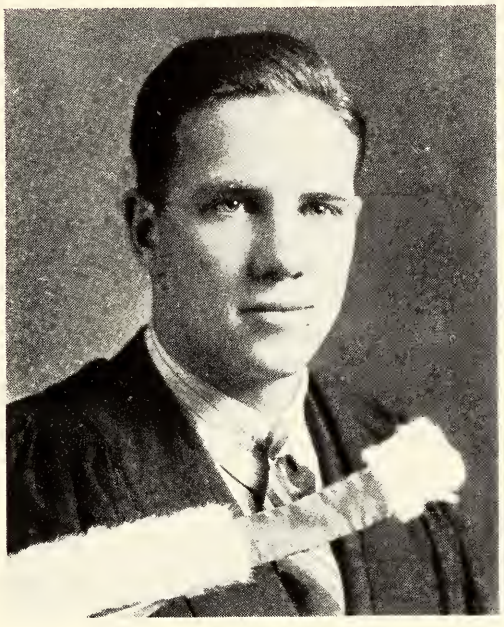
GORDON MCHENRY,
President.

"T" HOLDERS

"S" HOLDERS

Front Row: W. S. Glynn, A. F. Garcia, F. F. Walsh, W. Steeves, L. A. Patterson, D. Craig, K. Jackson.
Second Row: T. P. Callon, A. F. Raney, W. Diak, J. P. Stirling, D. Hutton, R. Fugler, T. M. Kingsbury.
Third Row: F. J. Lysaght, W. H. McLaren, J. M. Ferguson, G. Piper, I. G. P. Wheaton, H. W. Mole, F. H. Allen.
Back Rows: P. J. McCabe, J. S. Munro, E. P. Bridgland, W. P. Patterson, S. D. Turner, J. W. Ames, E. B. Wilson, H. J. Barrett, A. H. Black, G. Wood, T. Despard, L. R. Wood, V. DePaul, S. M. Jones, G. H. Fraser.

Bronze "S"



To Doug Turner was awarded the highest athletic honour that may be obtained in S.P.S. The Bronze "S" is significant of high athletic ability, popularity, and service to the Faculty. In all of these divisions Doug has a wonderful record.

In his first year Doug played on the Junior Intercollegiate Rugby Team and graduated to the Senior Team in his second year, where he played for three years and achieved remarkable success. He also played goal for three years on the S.P.S. Interfaculty Hockey Team.

In his first year he was first year representative to the Athletic Association. In his fourth year he was elected to the position of first Vice-President of the Engineering Society Executive. At the same time he was elected to the Athletic Directorate of the University. As first Vice-President of the Engineering Society, Doug was the man directly responsible for the success of the School Dinner and the School At-Home.

His popularity speaks for itself and he was known well, not only in this Faculty, but throughout the entire University. We sincerely hope that Doug's successes may continue in the same brilliant plane.

Congratulations, Doug Turner!

The Johnny Copp Memorial Trophy

Once again the Johnny Copp Memorial Trophy has been awarded to a Schoolman, namely, Doug Turner.

The name of Doug Turner is known to everyone, but particularly to Schoolmen, as Doug is 1st Vice-President of the Engineering Society—the man who gave us the best School At-Home yet.

That Doug is deserving of this honour may be seen from his imposing record:

1936-37—Junior Rugby in Toronto and District League.
Awarded III colour.

1937-38—Senior Intercollegiate Rugby.
Awarded I colour.
Interfaculty Hockey, Junior S.P.S.

1938-39—Senior Intercollegiate Rugby.
Awarded I colour.
Interfaculty Hockey, Senior S.P.S.

1939-40—Senior Intercollegiate Rugby.
Awarded I colour.
Member of Athletic Directorate.
Awarded Johnny Copp Memorial Trophy.

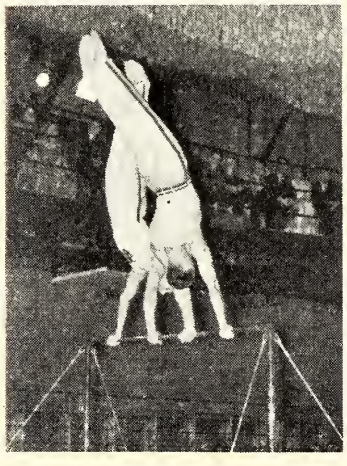
Congratulations to you Doug, from each and every Schoolman, —we're proud of you. May you tackle life's problems with the same enthusiasm and good sportsmanship that you have displayed on the field of Sport.

Phene Memorial Trophy

The third winner of the Phene Memorial Trophy is Ron Fugler. This cup is presented each year to the man on the Senior S.P.S. rugby team, who, in the opinion of his team mates has shown the most sportsmanship.

Ron Fugler, captain of the team, was an excellent choice, for he has that sportsman-like grace that can accept both victory and defeat manfully, that never-say-die spirit of which the School is so proud, and the ability that makes a great player.

This Trophy is a symbol of your team-mates' esteem, and may it be a reminder of the faith we have in you. Good Luck, Ron!



SENIOR RUGBY

Front Row: D. Hutton, J. Brisley, V. DePaul, R. Fugler *(capt.)*; F. Walsh, D. Allen, Y. Williamson *(mgr.)*.
Second Row: J. Stirling, R. Milne, C. Baker, A. Black, W. Ramore, W. McLean
Third Row: J. Ames, D. Campbell, W. Wachsmuth, A. Kingsmill, A. Stukus.

Senior School Rugby

This year School again fielded a traditionally fighting senior rugby team. Although losing three out of four games, we were in no game whitewashed.

With high hopes we took on St. Mikes up on the Trinity Campus on October 18th, and in spite of the fact we took them on, they took us to the tune of 6-0. We started well in this game blocking two of their kicks but were unable to capitalize on them, and due to a bad School fumble, St. Mikes scored their touchdown. This was the game in which Fugler tossed his sensational 50-yard pass to Barrie.

Six days later the Medicos entertained us up on the back Campus. This day we really enjoyed ourselves at our hosts' expense. We won, if you remember, 11-6. Little Don Allen scored our first touchdown picking up a very nice fumble behind the Doctors' line. Our second touchdown was scored by Jack Stirling on as nice a plunge as has been seen in many a long year around these parts. Barrie picked up the eleventh point on a misplaced placement.

It was not until November 8th that we met Meds again, this time without the services of Williamson and Stirling. Doug Hutton filled in well for these men. It was in this game that Bill McLean first showed his powers as a plunging half. Due mainly to Fugler's excellent running the score was kept down to 5-0 for Meds on the Vic field. That field is a jinx.

Two days later with that "play up and play the game" spirit, the tired S.P.S. team, tired partly because of the Meds game but mostly because of the Soph-Frosh the night before, took on St. Mikes again. This game was played in the rain on a very wet and slippery back Campus. In spite of the condition of the field, Ab Barrie ran the ends beautifully and Bill McLean, our new find, cracked the line again and again for good gains. Fugler caught and kicked in his usual good style, but in spite of all this St. Mikes ended up with four points more than S.P.S. to make the score 4-0.

Y. H. Williamson,
Manager.

JUNIOR RUGBY

Front Row: D. Rowland, W. Graham, J. Mees, D. Grosskurth, H. Ashton, G. Biggs, F. DeMarco.
Second Row: D. Zimmerman, D. Watson, H. McIntosh, J. Flett, W. Duncan.
Third Row: D. Marshall, *Manager;* D. Hamlin, W. Hodgson, J. Hawken, E. Percival, D. Hall.
Back Row: P. Kelly, W. Martin.

Junior School Rugby

The season provided a lot of fun and excitement ran high. For a team that was not considered much at the beginning, they certainly showed the experts where they were wrong. Although they had to start the year with a new crop of fellows, most of last year's stars graduating to the Senior ranks, they proved themselves to be just as good, if not better than last year's finalists, supplementing their own stars for the stars lost.

Junior School got off to a good start with a win over Vic. School's backfield was too good for the Vic team. Van Smith ran the ends and Bill Duncan went for big gains through the Vic line. Don Grosskurth played well on secondary and kicked a great game.

In the U.C. game, Bill Graham gave the team an early lead when he took a pass from John Mees and ran 30 yards for a touch. Bill Duncan ran U.C. into the ground with his shifty running and Murray Kilpatrick plunged well.

The return game with Vic was a tough one. Fumbles in the first quarter proved to be costly, and School accepted their first defeat. It was Vic's day, but the boys showed plenty of fight.

School started to click again in their last group game with U.C. The line played outstanding football—Bill Hodgson, Pete Rogers, Don Zimmerman, Chuck Rueben, and Bill Graham. Kilpatrick and Biggs went well in the backfield.

Three days later School met St. Mikes in the first play-off game. Jimmy Hawken intercepted a St. Mikes pass in the first quarter and ran 60 yards for a touch. School added another touch in the second quarter—Duncan carrying the ball. However, St. Mikes came back in the last half and tied the game.

The final game with St. Mikes saw School's hopes of a championship varnish. The play was even till half time with School holding a slight lead. A fumble near the goal line gave St. Mikes their first major. Their second major came by way of a flicker pass that really caught School.

School threw pass after pass, but the score ended in St. Mikes favour. Bill Duncan, Don Hamlin and Don Grosskurth played well for School.

Congratulations to you all, fellows, for a great effort. School is proud of you and is looking forward to watching you again next year.

DOUG MARSHAL, *Manager.*

TRACK

Back Row: D. F. Hutton, P. Onasick, J. C. Finlayson.
Front Row: R. F. Lewarne, J. R. Rodzil, G. A. Piper, T. M. Kingsbury, *Manager*.
Absent: J. G. Lucas, D. H. Isbister, G. M. McHenry, G. L. Goodwin, D. W Pringle, F. M. Hanna.

Track Harrier

School slipped a notch in their track effort this year when they placed third to Vic and Meds in their quest for the Rowell Memorial Trophy. However, many of the team's points were acquired by Freshmen, which brightens the prospect of future School track teams. Credit is due to all the boys who drifted up to the track after labs to see if they could acquire that necessary condition for the meet.

For their valiant attempt, orchids are in order for Johnny Lucas, who obtained School's only first by crashing to a win in the high hurdles and to a berth on the Senior Intercollegiate team; and for Finlayson, who was a standout by running a nice race to cop second in the mile and later ran fourth in the Senior Intercollegiate. "Fin" also was a member of the Senior Harrier team by virtue of another fourth in the Interfaculty cross-country run; for Goodwin, who ran a lovely race in the three-mile and later took the grind at the Intermediate meet. Jeff proved School's best bet in the Interfaculty Harrier by picking off second, and a berth on the Intercollegiate Team.

Besides Lucas, other Freshmen who showed up well were Lewarne, Onasick, and Isbister, all who placed well enough to pick up points for the University on the Intermediate Team. Isbister, though he lacked condition, pounded out a third in his specialty, the 440, and later showed up well for a second in the Intermediate Meet. Onasick threw the discus high enough and far enough to also get a second in the Interfaculty, and the same in the University Meet. Lewarne, who has aspirations for the Flying Corps, knocked off two fourths in the pole-vault.

Although both the Harrier and Track Teams only placed third, improvement should be due with many of the point winners back, and with some reinforcements in the field division, the Rowell Trophy should be back where it belongs.

T. M. Kingsbury,
Manager.

SOCCER

Front Row: Professor Allcut, L. M. Sebert, R. Martin, E. B. Wilson, R. N. Aldwinckle, D. Mackenzie.
Back Row: W. B. Sinclair, J. B. Moore, J. H. Seymour, M. A. Capper, L. C. Burke, C. E. Mudie, J. R. Shires.
Absent: J. B. Cronyn, W. Greig, G. Kennedy, R. S. Smart, D. Hibbard.

Soccer

S.P.S. got away to a poor start being held to a tie in both games with U.C. due to failure to capitalize on scoring chances. The speedy forward line proved capable of carrying the ball to the goal-mouth, but lacked the ability to put it into the net. School's defensive units had very little trouble in repelling the weaker offensives of the U.C. squad. A sharing of victories with the powerful Victoria team developed a three-cornered tie for the first place of the group.

In the play-offs for the group, School drew a bye, while the more experienced Vic team proved their superiority over U.C. It appeared that the final outcome was to hinge on a sudden-death, winner-take-all game. However, such was not the case. This game ended in a one-all tie deadlock even after ten minutes of overtime. What finally proved to be the deciding game was one which will be well-remembered by all of the participants for a good while to come. S.P.S. forged ahead on the basis of a hard shot to the corner by Seymour, School's centre half. Vic tied it up on smart passing plays and later took the lead on a penalty kick. In the second half, School came from behind when Seymour tallied with a penalty shot. The score remained deadlocked until the end of regulation time. However, in spite of such a comeback, Vic proved successful on a shot in the dying moments of the overtime period, and School relinquished her bid for the Arts Faculty Cup until next Fall..

Although not a championship team, there are many members of the team who proved to be of that calibre during the past season. Undoubtedly, the key-man of the team was Seymour, who was invaluable both offensively and defensively. Other first year men such as Capper, Aldwinckle, Mackenzie, and Hibbard ably filled the forward positions, while Burke was a standout on the half-line. Smart played sensationally at the outside-wing berth. Sinclair is to be commended for his valuable service in goal.

The future looks very bright for School soccer followers since the losses due to graduation will be negligible, leaving a forward and half-line intact for the new season.

E. B. Wilson,
Manager,

SENIOR LACROSSE

Back Row: B. Ballagh, J. Murray, R. Davis, J. Fisher, L. Wood.
Front Row: G. Wheaton, *Manager;* S. Jones, G. Kirby, F. Brown, F. Starr.

Senior School Lacrosse

Senior School was, as usual, placed in the strongest group in the league, with Dents and Victoria, and at the end of the regular schedule, since all three teams had collected the same number of points, all of this group advanced into the semi-finals.

The team had scarcely been organized when the first game was ordered against Vic. Whether it was lack of practice or otherwise, we lost it by a score of 6-5, and incidentally showed a great scarcity of condition. Bruce Ballagh and Fred Brown did most of our scoring while Lenny Woods in goal saved us from a higher score.

In the second game we edged out our keenest rivals when we defeated Dents 10-8 in a fast-moving game when every member of the whole team did his share of playing. Brown, Gord Kirby and Murph Murray supplied most of the spark in this session and made the dentists like it for a change.

The third game was about the best played by Senior School during the whole season and was a revenge for the first defeat by Victoria. We defeated them by 7-0 this time, the whole team playing like true Schoolmen. Fred Starr, Jack Fisher and Ron Davis were standouts but the whole team worked like a machine and the score was a good indication of the play.

In our next game with Dents our heads must have been slightly swelled by the game with Vic because we lost 5-4 and the less said about it the better, Stu Jones being the only one who showed any of the old giddap at all. Of course we did have the excuse that Ballagh had been injured in a previous practice and Kirby was laid low during the game, but even besides that, we played pretty poorly.

In the semi-finals the fast-stepping St. Mikes' squad took us by a score of 9-6 and although we fought to the last ditch, with Lenny Woods doing yeoman service in the nets, we were outclassed by the well-conditioned Saints. There was some consolation in the fact that St. Mikes finally won the Dafoe Cup, and in our opinion, they well deserved it.

We finished the season by defeating the Junior Schoolmen by a score of 7-6 and they still claim that it was our goal tender who saved us from a horrible end. Who knows? Maybe it was!

GIB WHEATON,
Manager.

JUNIOR LACROSSE

Front Row: R. F. Lewarne, J. E. Quist, *Manager;* H. F. Moorehead.
Back Row: F. I. Belford, A. W. W. Steele, F. W. Kellam, W. H. L. Bryce, J. A. Grant, L. J. Lennon.
Absent: G. E. W. Reeves, F. S. Radmore, K. M. Gilbert.

Junior School Lacrosse

Once more the Junior Lacrosse team has been a worthy representative of this Faculty in the "gutted-stick" game. From the start of the season they have played good clean lacrosse.

Radmore and Belford, last year's stars, combined with Lewarne to give a close-checking, top-scoring forward line. With Reeves, Grant and Lennon looking after the defense duties, Steele in the net had few worries. The other forward line of Gilbert, Moorehead and Kellam gave a stellar performance throughout the entire season.

The Juniors were grouped with Pharmacy and Meds and managed to win the group without losing a single game. To single out any special stars during the schedule is almost impossible since all combined to give a perfectly balanced team, both defensively and offensively. Special credit may be given to Newman, the goal-tender from School's III team, who took over Steele's position when the latter was injured. Bryce, a defence-man, from the same team, also gave us added strength on the rearguard in the semi-finals.

In the semi-finals Junior School was grouped with Senior School and St. Mikes in a round-robin series. The first game, with the Seniors, was a closely fought, well-played game with them coming out on top by a one goal margin. The following game, with St. Mikes, was very important because a victory for us would tie all three teams again. Despite good playing and a grand rally in the last period, we were forced to accept a 10-8 defeat from St. Mikes, who went on to win the Dafoe Cup.

Next year's chances look bright for Junior School with Belford, Lewarne, Kellam, McNulty, Prentice and Rankine to form a reliable squad since the latter three played with the III team this year and have obtained valuable experience.

Anyway, congratulations, men, for a swell performance. You all played heads-up lacrosse; you all gained valuable experience, experience that is needed to win cups; you came close this year, next year make sure of it!

J. E. Quist,
Manager.

THIRD LACROSSE

Front Row: J. KENT, R. FORESTELL, A. RANKINE, T. NEWMAN *(absent)*.
Back Row: F. STARR, J. BRENNAN, J. PRENTICE, C. MCNULTY, A. LAMBE.

III Lacrosse Team

The boys were gathered together just in time to meet the champion St. Mikes team and suffered a 10-0 defeat, in which, despite the score, the great goalkeeping of Ted Newman, School goalie, featured. After a couple of practices we took on the U.C. boys and laced them 11-2, Newman again starring, while Rankine and McNulty offensively and Bill Bryce defensively, played leading parts. Again we met St. Mikes to our misfortune and again we were beaten, this time 14-3. However, we held them to a 3-1 score at half time, and only lack of condition kept the score from being much closer.

In the last game, we met U.C. again, and after a slow start we scored 5 goals in a fast and furious last quarter to gain a 7-7 tie. Carl McNulty, with 3 goals, Al Rankine, Joe Prentice, and Alex Lambe with his first and last goal of the season, led the final period onslaught. Unfortunately our good defenseman Bill Bryce missed the game as he was moved to the Juniors.

Ted Newman—Goal. Ted gave the team plenty of protection in the nets with his excellent goal-keeping. Ted was especially good at smothering the close-in shots.

Bill Bryce—Defense. Bill was like the Rock of Gibraltar on defense and a dangerous attacker also. It was a severe blow to us when Bill had to miss the last game to play with Junior S.P.S.

John Brennan—Defense. John alternated at defense with Bill and held out the enemy forwards with ease.

Alex Lambe—Defense and Forward. Alex played both defense and forward and, although this was his first year playing lacrosse for School, he could always be counted on to turn in a hard and aggressive game.

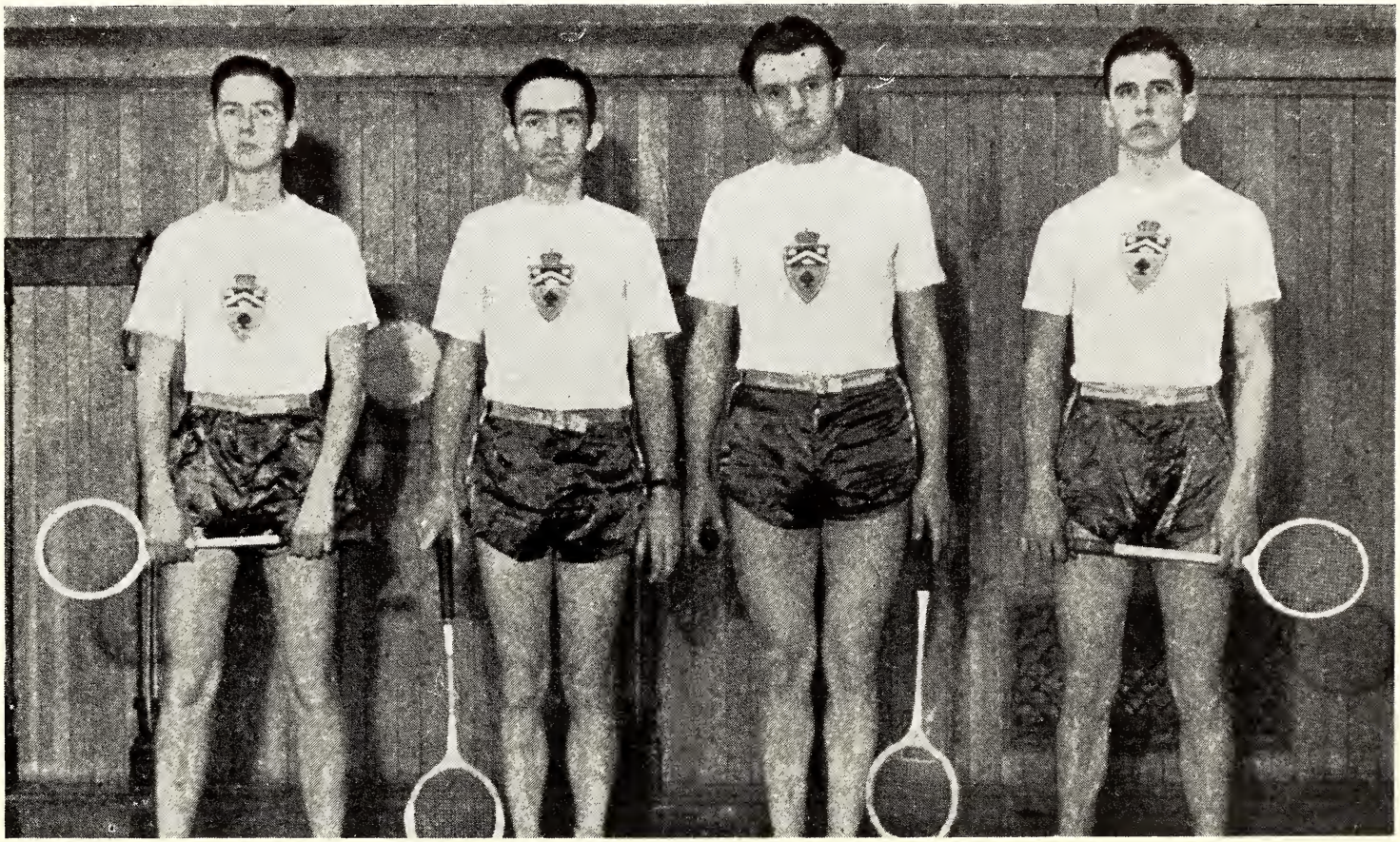
Bob Forestell—Centre player deluxe. Bob was small, but scrappy. Checking was his specialty as many an opponent will testify.

Joe Prentice—Burly Forward. His weight made him effective on all parts of the floor.

Al Rankine—Stick-handling wizard, who set up many a play resulting in disaster for the opposition.

Carl McNulty—Forward. A hard checker, and he led the team in scoring with his bullet shot.

"Jo" Kent—Did not join the team till late in the season, but he was very effective and a hard worker for the team.



SQUASH

L. C. West, J. R. Fitzpatrick, H. S. Wainberg, M. Wilson.

Squash Raquets

An innovation took place after Christmas this year, with the introduction of a squash tourney sponsored by the Athletic Association. This is the first year that squash has been included in the regular intramural program, and that points have been awarded in the T. A. Reed trophy race.

Squash recognition is partly due to the efforts of H. Wainberg, No. 1 man on the S.P.S. team this year, and secretary of the Hart House Squash Racquets Committee.

School entered a team, as she does in every sport, and as this goes to press, the School team has just been declared a championship one.

The tournament was arranged so that each faculty was entitled to enter a four man team. The team entered was decided upon by running a seeded elimination tournament in School, previous to the beginning of the intramural tournament. The four men in the semi-finals of this competition comprise the championship team. The four men, in their order or ranking, were: Howard Wainberg, John Fitzpatrick, Murray Wilson, and Lionel West

The tournament was divided up into four flights, with the best man of each team in the first flight. This tournament was also an elimination tournament with points awarded for each match won. This tournament ended in a 3-way tie with Medicine, Trinity and School having 11 points.

This freak situation called for a round-robin replay, in which to date School has won 5 matches out of a possible 8, with one more to be played.

Two members of the team graduate this year, but School will enter another team bent on keeping the championship next year.

John Fitzpatrick,
Manager.

SENIOR BASKETBALL

Front Row: W. P. Fry, D. McConvey, J. M. Ferguson, H. J. McLean, H. F Coupe.
Back Row: W G. Murray, W. Bruce, W. A. Polson, F. Allen, *Manager;* A C. Hudson, J. Hirschorn.

Senior Basketball

Pitted against a powerful veteran Senior Meds team in their first game, Senior School turned in a very poor exhibition to the tune of 43-8.

Two weeks later Senior School pranced out on the hardwood court as an organized unit of the S.P.S. Athletic Association, clad in new uniforms unanimously acclaimed as the snappiest in the interfaculty circuit. They whipped through a preliminary warming-up drill preparatory to meeting a mediocre Senior U.C. basketball club, but when the final whistle sounded, our Senior cage squad found itself the loser by a seven-point margin. The Club had learned to score, but was still sorely lacking in defensive ability.

The next game featured Senior Vic with the stars of last year's University Champion Quintet supported by new material fresh from last summer's series of hard-fought basketball battles on the shores of Lake Couchiching. Senior Vic proceeded to do pretty much as it pleased in the first half of the game, but in the second period, it finally happened! With Reid and Allen checking their hearts out defensively, and the whole team playing brilliant basketball offensively, our Senior hoopsters outscored their rivals by twelve points, and although they failed to overcome their first period deficit, they showed real basketball prowess which should make the second round of the series a different story.

Basketball is School's most popular sport, and with three squads of Sophomores and Freshmen having completely filled the remaining S.P.S. team quota, it became necessary for the Senior squad to post a ten-man dressing list for each game, and to rotate its players giving everyone who participated regularly in the practices a chance to do his bit toward a hoped-for School victory.

It was interesting to watch the offensive combinations of MacLean, Hirschorn, Coupe, DePaul and Murray. Fry and Polson proved effective on fast breaks, while Reid, Thompson and Ferguson worked well defensively under the basket. Allen as manager, attempted to field the best possible defensive combinations and fill as best he could the weak spots in these two departments, of which, unfortunately, there were too many. It's a fighting team, and a fighting team is bound to win.

FRASER ALLEN,
Manager.

JUNIOR BASKETBALL

Front Row: A. Halford, H. Barrett, R. Pile, *Manager;* P. Schell, T. Campbell.
Back Row: W. Bryce, E. Mitchell, J. Lucas, J. Hurst, R. Brooks.
Absent: J. Bell.

Junior Basketball

This year School has a team that should go far in interfaculty competition. The boys have really worked hard in practices and the games show the results of their labours. A man-to-man defense was found to be the more effective and the opposition have had little opportunity for long shots.

The first game with Junior Vic was a tight game. At half time we were trailing by a 19-7 score, but finished strongly to take a close 29-26 decision. The next game against Junior U.C. was a poor brand of basketball. U.C. played poorly and reduced us to their style of play. However, we finally finished on the right side of a 26-24 score. In our game against Junior Meds, the team finally found themselves and after a very even half, held the opposition scoreless for the second frame to take the 26-8. In the first game of the second half of the schedule, against Junior Vic, the game was School's all the way. Leading 9-5 at half time, the final whistle found us on the top end of a 20-15 count. Smooth teamwork featured the game and very close checking held the Vic sharpshooters in check. This game was the deciding one as far as the group leadership was concerned, the victory guaranteeing supremacy of the group.

The lads have been working very well together, team play is the main thing and the boys have been displaying a very high calibre of team work.

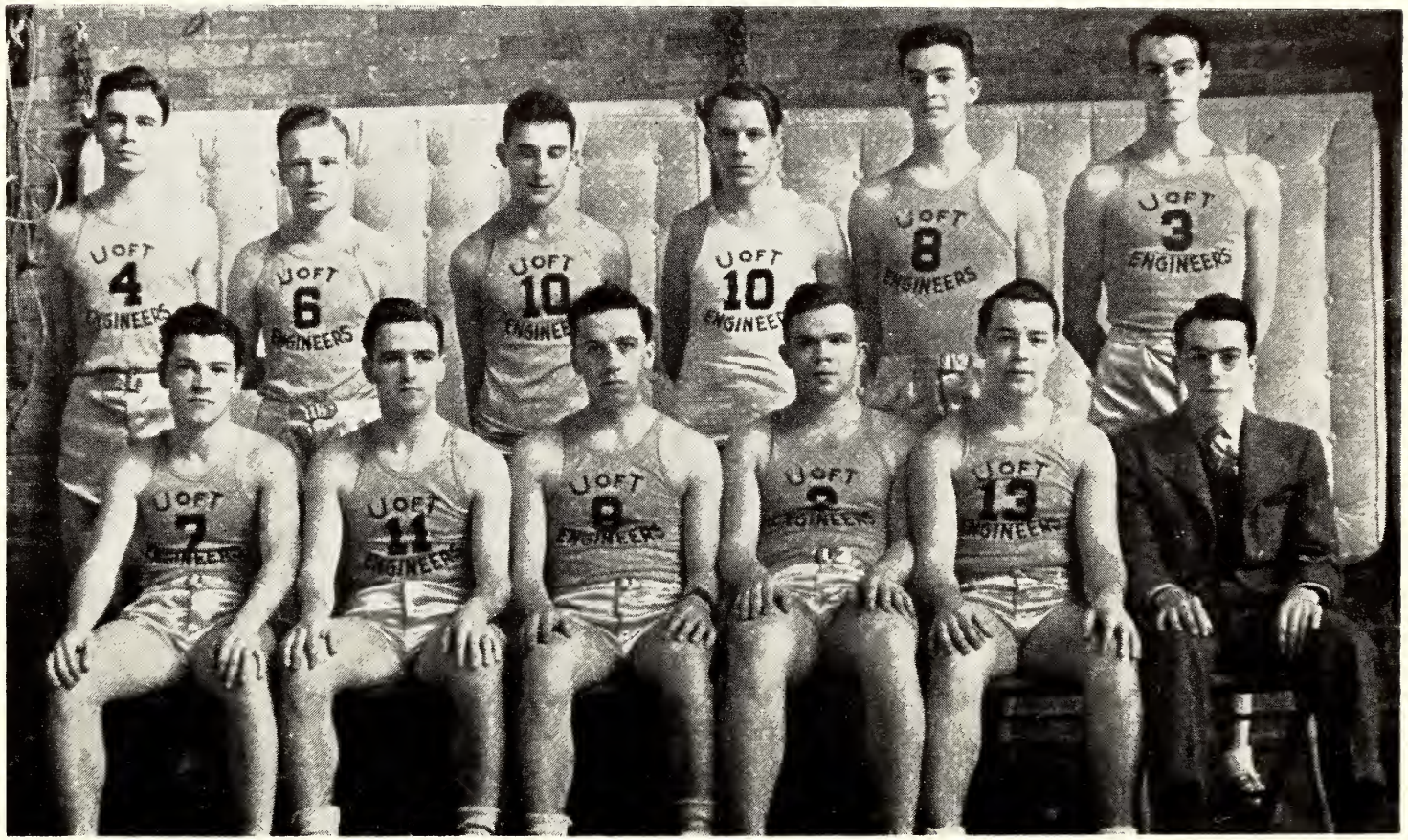
Jim Bell and his fellow guard have been fighting it out for top scoring honors and have more than helped fill up the score sheet —keep it up boys! The first line, consisting of Jim Hurst at centre with Mitchell and Lucas as forwards, have caused their checks many headaches with their consistent scoring.

The alternates, Phil Schell, Art Halford, Tom Campbell constitute a set of small persons but excellent ball handlers who can always be counted on to come through when the team needs them most.

Last, but not least, is Bill Bryce, the reserve guard, who is a good man for receiving the ball under the basket.

From the above it is easy to see that the team is made up of men with all-star ranking, nothing but the truth, nothing but the truth. With the group leadership under their belts, this team will be fighting hard to bring the interfaculty basketball championship to the Little Red Schoolhouse.

Ron K. Pile, *Manager.*



THIRD BASKETBALL

Second Row: A. G. Elliott, W. A. Montgomery, A. I. Chepkin, T. C. Oliver, W. F. Campbell, J. B. Bell.
First Row: H. J. Tod, J. A. Clements, C. C. J. Theurle, J. A. McCallum, R. K. Pile, P. C. Schell.

III Basketball

Although this is supposed to be a second senior team, most of the men are Freshmen; besides this, their average height is probably less than that of any other team in their group. However, they pitched in and worked real hard, and to date have made a very creditable showing.

A decisive win over U.C. gave us a good start, but the second game against a taller, more experienced Meds team brought disaster to the tune of 39-13. Vic was said to have as good a team as Meds, but the boys tore into it at practices, and in the game, Vic found us no pushover. In fact, after thirty minutes of handing the lead back and forth, the final horn found us on top by 25-24.

Oliver—"Dead-eye Dick" of the hoops; a prolific scorer, and, when in the mood, good defensively. This is his first year in the interfaculty game, and he should go far.

Bell—Tall, and useful under the basket both on defence and offence. Jack throws some queer ones that go in at crucial moments.

Campbell—Another tall man, who is developing a pivot shot that should swell the score considerably. His defensive work is improving steadily.

Chapkin—Shifty, fast-breaking forward. He and Elliot make a pair that bear the brunt of the offensive play.

Pile—An old standby. Ron will fight for the ball as long as he can see. He gets his share of the points too.

McCallum—Our Mannerheim Line. Mows down the attack and is deadly at long-range shelling. He also has an overhand shot from the foul line that piles up the points.

Montgomery—Wtih McCallum, completes a strong defence; is shifty and fast on offence as well.

Elliot—First-string forward whose fast breaks down the centre leave opposition flat-footed. Good also on set shots, and steady defensively.

Tod, Clements, and Theuerle—Our "dwarf" trio. Small, but smart, aggressive, and fast. They probably work harder than any other three men on the team.

Buchanan—A late arrival whose play shows improvement with every game.

P. Schill, *Manager.*

FOURTH BASKETBALL

Front Row: L. Durbin, K. Mark, J. W. R. Wilson, F. W. Kellam, H. F. Moorehead.
Back Row: J. Prentice, W. S. Martin, W. A. Gow, R. Workman, W. Wallace.

IV Basketball

At the time of writing, the IV team has won all its games, defeating Meds, Dents B, Trinity, and Meds in that order, winning all games by at least 10 points. The team has never really been extended but when they reach the play-offs they will have more than enough competition. The success to date has been due to good team-work more than individual effort. The team works well as a unit and the results speak for themselves.

Workman—playing centre to both lines; a smooth ball handler and an accurate shot from inside. Learned his basketball at North Bay Collegiate.

Kellam—a fast-breaking forward who has as lovely a shot as one could wish; he can always be counted on for a large quota of points.

Wilson—Forward, would stand out in any man's league; has a habit of breaking up passes and turning them into baskets.

Moorehead—has played for School for two years and is a steady player, seldom letting his check away.

Mack—A steady player who can outjump a person twice his height; a good play-maker.

Gow—A big man, who is rapidly turning into a first-class defenseman. He can pick off rebounds without straightening his arm. Oh, to be 6 ft. 3!

Prentice—Another heavy defenseman who gives a good account of himself in every game.

Martin—A North Toronto product, who has plenty of height and condition, and so makes things tough for the opposition.

Reynolds—An old-timer at the game; learned his fundamentals at North Bay Collegiate. He never lets a man around him, nor a ball get away from him. A heavy, hard-hitting defenseman.

Durbin—A fast, deadly accurate shot, who can cover his own and a couple of other men. Adds that fear of attack to the defense.

So there you have them—a fast, smooth-working team which really does School credit. The boys are all out to win that Trophy, and they are going to be hard to stop. So, look out, we're coming!

P. Scheft, *Manager.*

SENIOR WATERPOLO

Back Row: F. F. Walsh, P. B. McCrodan, F. J. G. Lysaght, J. M. King.
Front Row: W. H. McLaren, J. M. Girvan, T. M. Kingsbury, *Manager;* E. G. Bainbridge, F. S. Idenden.

Senior School Waterpolo

The season opened with Vic III team taking the plunge by a score of 9-0. The next game with O.C.E. proved little trouble. with School winning to the tune of 5-1. O.C.E.'s team put up an interesting battle at the next meeting with School, the game ending in a 2 all tie.

Those giving of their talent to the team, (and on the side gradually emptying the Hart House Pool) are:

Jack Girvan—Rover. Girvan was unanimously elected captain of the team. He is well-deserving of the honor and all the team are for him. Besides turning in several defensive games, he has collected half of the team's total goals.

Tiny Bainbridge—Goal. "They shall not pass" is Tiny's motto and he certainly lives up to it. Up to date, he has one shut-out and only three goals scored against him.—Keep it out Tiny!

Fred Walsh—Defense. Fred is an old timer at the game and is the backbone of the defense. Fred is dynamite when it comes to keeping the boys away from the goal.

Frank Lysaght—Defense. Frank takes his place beside Fred and keeps the other side of the goal well protected. Frank has a habit of always taking the shortest route to the ball no matter who is in his way.

Wes McLaren—Forward. Wes gives the opposition plenty of trouble and is an annoyance to the goal-keepers by continually putting the ball in the net.

Jim King—Forward. Another old hand who has acquired the knack of getting goals. When Jim starts sprinting towards the goal, look out.

Frank Idenden—Forward. When Frank gets a shot away, he literally blasts out the opposing goalie.

Tet Patte—Forward. Ted is new at the game. What he lacks in experience he really makes up in enthusiasm. Ted is always ready and willing to go.

Peter McCrodon—Centre. This is Pete's first year at the game, and he has shown real class for a beginner. He always gets to that ball and away she goes.

Tom Kingsbury—Playing manager and coach, who joins in the fun now and then when some of the boys get waterlogged.

TOM KINGSBURY
Manager.

JUNIOR WATERPOLO

Front Row: J. Iglesias, B. Staples, F. DeMarco, P. Turner, A. Ritch.
Back Row: G. Reeves, D. Allan, J. Bell, P. Rogers.

Junior Waterpolo Team

This year's Junior Waterpolo team is one of the best ever turned out by School. In five games to date not one defeat has been chalked up against this powerful aggregation.

They started the season in excellent fashion by taking Trinity, last year's champions, by a 4-0 score. The team's second and third games resulted in two more shut-outs when they whipped Junior Vic by 2-0 and 6-0 scores. School's strong defense showed up well in their fourth game which resulted in a 0-0 tie with a strong Junior Meds squad. In their last encounter to date the team met Trinity for the second time and took a 3-1 decision without much difficulty.

And so we find Junior School Waterpolo team perched at the top of their group and having outscored their opposition 15-1 in their five games to date. It certainly looks as if the Eckhardt Trophy will rest in School again after a long absence.

Jack Bell—in goal we find the ever reliable Jack Bell, one of the players left from last year's team. Jack's record of one goal scored against him in five games speaks for itself.

Doug Allan — forms one-half of an exceptionally strong defense. Doug having profited immensely from a year's experience has developed into one of the best defensemen in the loop.

Pete Rogers—who is having his first season at waterpolo is improving with each turnout. He is a fast swimmer and a hard worker and is proving himself to be a real asset to the team.

Bill Staples—centre—is one of the leading scorers of the team. A fast and tireless swimmer, Bill is very effective around the net.

Frank DeMarco—Rover. Another of the veterans from last year's team. Besides playing Frank is coaching and managing the team this year. Frank has a habit of scoring goals from the centre of the pool with hard, accurate shots.

Peck Turner and George Reeves—Forwards. These boys both have deadly shots and have been getting their share of the goals to keep the School team at the top.

Fowlie, Iglesias and Ritch round out this year's team. Fowlie played last year and is a steady player. Ritch and Iglesias are hard workers and show promise.

R. Workman,
Ass't. Manager.

SENIOR HOCKEY

Front Row: J. K. F. McLinden, S. D. Turner, H. W. Mole.
Back Row: W. D. MacLean, *Manager;* D. F. Hutton, M. B. Allan, J. S. Munro, E. T. Galway, E. P. Bridgland, W. A. Robinson, E. A. Weir.

Senior S.P.S. Hockey

At the time of writing, Senior S.P.S. has won three games and lost two. In the first game of the season, St. Mikes took the measure of S.P.S. to the tune of 6-2. However, in the return engagement, with S.P.S. in better condition, St. Mikes fell to the score of 4-2. Junior Meds proved to be no match for the Engineers, losing 6-0 and 5-1. Trinity holds the other victory by a narrow margin of 2-1. The return engagement between S.P.S. and Trinity promises to be a real affair as the winner will enter the play-offs against St. Mikes. This is on the assumption that Junior Meds do not upset St. Mikes. As Trinity and St. Mikes played to a 1-1 tie in their last encounter, the odds seem to point to the Schoolmen to take the group Championship from last year's Interfaculty Champions, Trinity.

Along with the men pictured above, others have played prominent parts in victories with the team. Bill Moore alternates in goal with Doug Turner, and Gib Wheaton played in the first game of the season. George Wood played the first game also, is now ineligible as he is playing with the Intermediates. George is doing a good job as coach of the team and hopes to wind up with S.P.S. holding the Interfaculty Championship once again.

W. D. MacLean,
Manager.

JUNIOR HOCKEY

Front Row: D. E. Grosskurth, J. N. Dickie, J. A. McIntosh, K. G. Hamilton, J. A. Simpson *(Playing Coach).*
Back Row: M. W. Douglas, A. W. Deeth, D. V. Roland, W. A. Moeser, S. G. Penoyer, W. K. Hambley, J. E. Quist *(Manager).*

Junior School Hockey

From a large number of players the coach, Jack Simpson, has chosen a fast-skating, close-checking squad to represent School in the group with U.C., Dents, and Vic I.

McIntosh, a cool, steady player is "tops" in the nets with Hambley and Hamilton forming a hard-hitting pair of defensemen. Moeser and Simpson also give McIntosh ample protection with their sure and stiff body-checking on the defense. The offensive duties are well taken care of by two well-balanced lines. Dickie, Penoyer, and Roland, as one line, have given a splendid account of themselves, scoring almost one-half the team's goals. The other line of Deeth, Grosskurth, and Douglas has been going "great guns" but has suffered a few misfortunes. With the season only half over, Douglas has been banned from the team by an intermural ruling, and Grosskurth has been out with an injured chest. Godefroy, who shows great promise, has substituted for Douglas and the line will soon be "hitting their stride" again.

In the first game, with U.C., the Juniors won 3-2 with Penoyer, Dickie and Simpson getting the counters. After a few needed practices, they met Vic I and were able to secure another victory. Douglas led the scoring with 2 goals, with Dickie, Penoyer and Grosskurth adding to their scoring laurels. The game with Dents was a well-played contest with School hitting the twine five times, thanks to the splendid efforts of Deeth, Moeser, Roland and Douglas, who accounted for two goals. Minus the services of Douglas and Grosskurth, the Juniors were successful in defeating M.C.I. by a score of 3-0. McIntosh, who was "knocked out" during the game and the newcomer, Godefroy, gave stellar performances as did Roland, Penoyer and Simpson, the scoring trio for this game.

Even with two games of the schedule yet to be played, it is certain that the Juniors will be in the semi-finals and battling for victory. All the credit for the formation and condition of this team is due to the tireless efforts of the coach, Jack Simpson, and the players' co-operation.

Next year, School may look forward to a strong, well-balanced team since the Juniors will remain intact, except for graduations to an intercollegiate team, as this year's team is now entirely 4T3 men.

Ron Pile,
Manager.

THIRD HOCKEY

Back Row: A. Garcia, A. Lambe, M. Macleod, A. Raney, G. Renshaw, G. Wheaton, *Manager;* B. Ballagh.
Front Row: J. Grier, W. Sinclair, Y. Williamson, J. McCabe.

S.P.S. III Hockey

When the Athletic Association decided to have four teams in hockey, they made it pretty tough to produce a third hockey team which at least at the beginning of the season, look to be the Engineers—but actually it was a good idea because we extracted plenty of players who would otherwise be still lying dormant. These "dark horses" transformed the "thirds" into a team which at least at the beginningg of the season, look to be the winners of their group in the Jenning's Cup race.

The schedule caught us napping at the first of the season and our first game with Emmanuel was called for the second day after the Christmas exams. Without any practice and no organization whatsoever, we gathered together a team composed of seniors, juniors, thirds, and what-have-you and managed to beat the Theologs, by a score of 3-1. Bob Forestell, who later played for the fourths, since he was in second year, scored all the goals, and along with Kelly, played real hockey.

After a few practices, we again met the Emmanuel team and our practices showed to advantage because we beat them this time by a 6-1 count. Al Garcia, our "tired but happy" centre star, scored four of them while Bill Sinclair, his right-wing mate, got one and Johnny Greer, another right-wing speed merchant, got the other one. The team was beginning to look like a team in this game but still required a lot of practice.

In the third game, with O.C.E., the team played their best game to date but the O.C.E. goalie showed some stellar net minding and we only won by a score of 2-0. Bruce Ballagh and Johnny Greer registered the two goals but the whole team showed up well and at this rate should win their group handily.

York Williamson, who took over our goal-tending duties, although he has had little experience, is reported to be aiming at Turk Broda's job. Our defence, consisting of Bud Raney, a hard-working rusher of note, Alex Lambe and Murray Macleod, two hard hitters, and George Renshaw, a super-poke checker, was one of the outstanding assets of the team and proved a puzzle to the opposition all year. Jack McCabe, a stick-handling expert, patrolled the left-wing position with Garcia and Sinclair, and played stellar hockey all season.

GIB WHEATON,
Manager.

FOURTH HOCKEY

Front Row: I. Shepherd, R. Forestell, A. Kepper, H. Seymour, R. LeSueur.
Back Row: F. DeMarco, P. Kelly, C. McNulty, R. Quinttenton, J. Hawken. *Absent:* D. Hamlin.

S.P.S. IV Hockey

This team is something new for School. In previous years there have been only three teams, but this year due to the greater number of potential players turning out for the teams, it was thought advisable to have another Junior School team, namely the IV team.

The team, so far, has well justified its being, having won its group handily with three conclusive victories, against U.C. III, and Aerial Navigation, winning 3-0 against the former, and 8-0 and 6.-0 against the latters.

Kepper—goalkeeper. Hasn't yet been scored on in a league game, a record which speaks for itself. During the rest period in the second game, he suffered a bad cut on the face, but came back for the third game, and earned another shut-out.

Hal Seymour—defense. Leading defense scorer and has been credited with a goal while lying on the ice. A good defenseman and a playmaker, who would be a credit to any team.

Dick Quittenton—defense. Isn't afraid of anything that skates. He has a reputation for picking on the biggest fellow on the opposing team and we don't know how, but he often comes out on top.

Frank DeMarco—defense. Noted for his solo goal getting and his rushing tactics in general.

Bob Forestell.—centre. The cleverest playmaker and stick-handler on the team. He is the leading scorer on the team, and also the fastest skater.

Brian Kelly—right wing. Plays on the line with Forestell and between the pair the team can usually count on at least two goals.

Jim Hawkens—The left winger on the above line, who works hard but who hasn't as yet scored a goal.

Charlie McNulty—utility man. Is playing defense at present, but can be used to advantage in any position he is asked to play.

Ian Shepherd—centre.

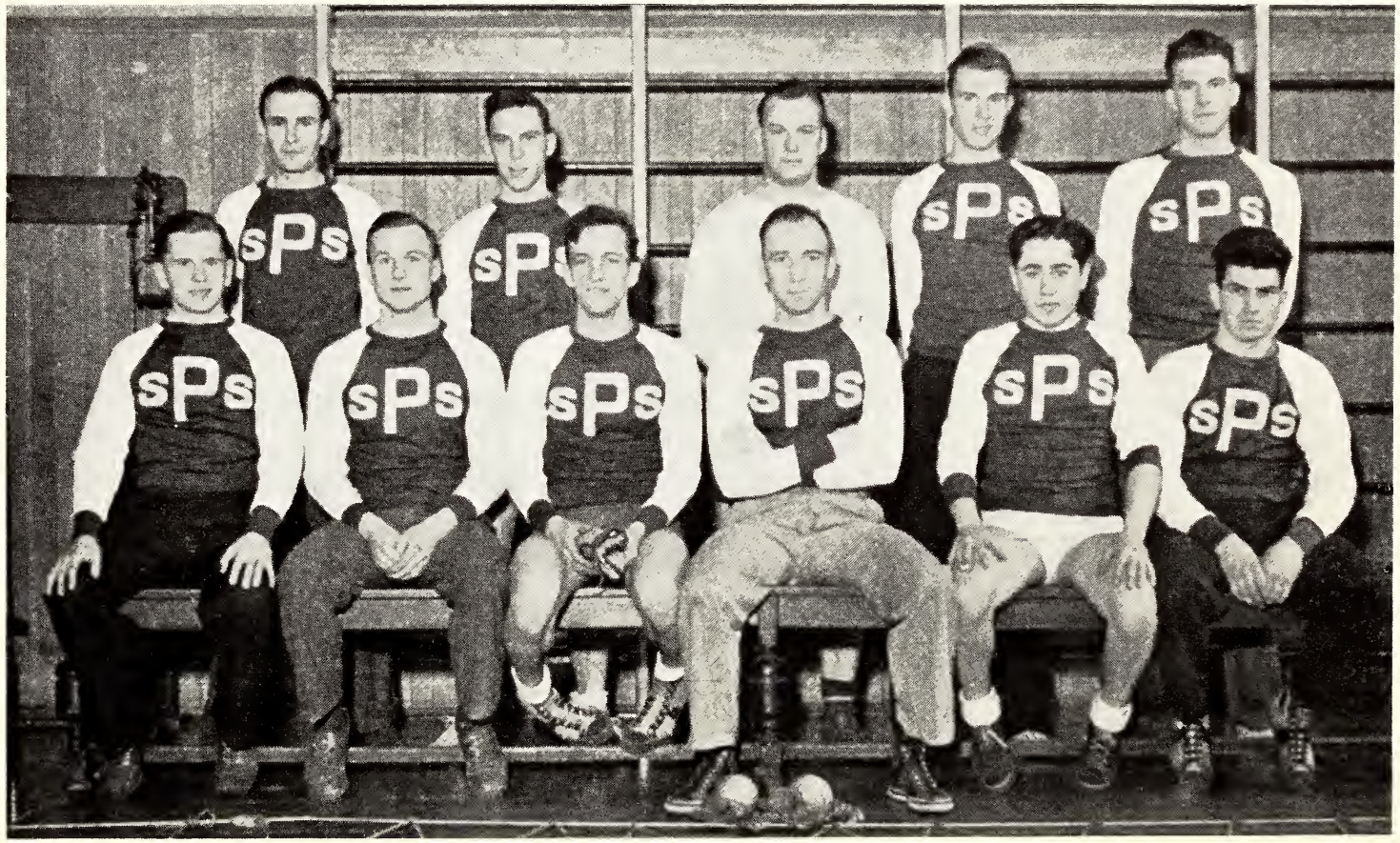
Don Hamlin—left wing.

Dick LeSueur—right wing.

These three players have been improving every time they are together and with a few more practices they should be tops.

The team as a whole, is a well balanced and hard fighting outfit and should go far towards winning honour for School.

J. Hawkens,
Manager,



SENIOR BASEBALL

Front Row: W. Fry, J. Milne, G. Wheaton, G. Kennedy, J. R. Jaffe, O. K. Smith.
Back Row: F. Brown, R. Fugler, W. Diak, G. A. Renshaw, P. J. McCabe.

Senior School Baseball Team

This year the team started off very poorly, playing like a bunch of amnesia patients against Meds. As a result of this play by proxy business, and some bad management, the team was soundly tucked to bed by Meds by 15-1 — whew! what a nightmare.

Anyhow, feeling they were a little better than that, the boys brought along their baseball brains against Vic and wrangled out a 7 all tie. This was indeed an improvement and a little fight was shown by School in coming from behind in the second inning to go ahead by 1 run. However, in the fourth inning, Vic tied up the game by good hitting and so we only got 1 point.

On the day of the great battle against U.C. ye olde team was read the speech from Gettysburg which put them in a scoring mind. In the game everyone played top-notch ball and School won easily 12-6.

It is unfortunate that the schedule is only half over, for things are just about all tied up in the group. By winning our three remaining games, School can end up on top. We have a hard battle in view against Meds, but with all the boys playing the type of ball that they are capable of playing, we hope to come out on top.

Milne and Wheaton—Catchers. Milne playing heads-up ball all the way, snagging them at the plate and keeping the whole team on its toes.

Diak and Fry—Pitchers. These boys put plenty of zip and speed on that old ball that makes it hard even for the catcher.

Munro and Brown—First base. These boys hold down the first sack where most of the putouts are transacted.

Smith and Fugler—Short stop. These boys are both good, and it is hard to discriminate who plays when.

Hirschorn and Renshaw — Second base. A mighty smooth pair—a mighty smooth pair, yes sir!

Joffe and Kennedy—Third base. These two can really bat that old pill as well as put 'em out.

McCabe, Kingsbury and Reynolds—Field. They pick 'em off the wall like grapes off a vine, and just as sweet.

George Kennedy,
Manager.

JUNIOR BASEBALL

Front Row: H Perks, R. LeSeuer, A. Death, J. Cawley, N. Christilaw, H. Ashton.
Back Row: F DeMarco, J. E. Webb, W. Bland, D. Pringle, W. F. Campbell, J. Leitch, G. E. Morley, B. McKendrick.

Junior School Baseball

At the first practice there was an abundance of players on hand to show prospects of a good team, and our hopes proved to be not ill founded. The team finally chosen to represent Junior School consisted of Cawley as catcher, with Pringle ably doing the hurling. The infield of Leitch, DeMarco, and Deeth on the bases, with Perks at shortstop were a smooth working combination ably backed up by Morley, Ashton, and Christilaw in the field. The alternates of Webb, Bland, Campbell, and LaSueur showed their ability also as hitters.

At this time the team has played three games, winning the first from Jr. Meds 8-2, and repeating with a win over Jr. U.C. of 8-4. In the third game Jr. Vic came out ahead by the score of 5-3 in a hard fought contest. However, we are waiting to reverse the decision in the next encounter.

Tribute can be paid even at this stage to Pringle for his fine pitching and our success during the remainder of the season will depend to a certain extent on Don's long right arm. The team is a hard working unit turning out one and all for every practice, and this fact bodes well for a place in the playoffs.

At the time of writing, the competition for the best hitter on the team looks like anybody's race, with Harry Perks, the sole survivor of last year's squad, giving the boys plenty of competition. Al Deeth, however, is not far behind him.

Bruce McKendrick, the coach and manager (also the chief worrier), has a little bet on with the manager of the Senior team that Jr. School will come out a jump or two ahead of the latter's aggregation when the final chips are down.

We would like to predict that if the team fails to win the championship this season, they will annex the silverware next season, as the team will be practically unchanged next year.

Bruce McKendrick,
Manager.

THIRD BASEBALL

Front Row: G. B. McKendrick, J. A. B. Milne, *Manager;* W. A. Robinson, T. M. Kingsbury.
Back Row: W. E. Hodson, H. J. Crawford, W. J. J. Parchello, C. B. Gill, J. J. Orlando. L. Durbin, A. D. MacKenzie, J. E. Allen.

III Baseball

At the beginning of the season, S.P.S. had a large turnout of ball players, so much so, that the Intermediate Baseball team compared favorably with the Senior and Junior squads. At present the season is more than half over and we have played four games.

We were away to a good start, winning our first game against those arch rivals, St. Mike's. The next game against Wycliffe was a heartbreaker. It finally ended 10-9 for Wycliffe. Some fine hitting was demonstrated in this game by Bruce McKendrick, Bill Hodson, and Johnny Allen. Against Dents we had a lapse of hitting strength and we dropped the game by the score of 4-0. A return game with Wycliffe resulted in our favor, to the tune of 3-2. Bill Robinson pitched an excellent game allowing only two hits, while Mackenzie and Parchello supplied the power at bat.

Bruce McKendrick was our first string catcher, and can always be counted on to turn in a good game even if he does occasionally get his fingers in the way.

John Orlando held down the first sack and handled it to perfection, as well as contributing a good share of the hitting.

Tom Kingsbury produced some excellent fielding at right short stop, when he wasn't playing waterpolo.

Meckenzie was one of the brighter lights at hitting as well as being a fine fielder.

Bill Parchello at short stop shows signs of becoming one of S.P.S.'s best athletes in the coming years, since he plays a first-class game of baseball and basketball.

Bill Hodson at third base supplied many a needed hit and did a fine job at the hot corner.

Johnny Allen, another infielder, who always can do the right thing at the right time.

Louis Durbin and Gill were our two outfielders, and they both rate high in all departments of the game.

Jack Bell and Crawford were two pitchers who could also play a good game in the field.

Bill Robinson is our newly acquired pitcher and without a doubt, he throws the fastest ball in the group, and compares very well with the Seniors.

J. Milne,
Manager.

FOURTH BASEBALL

Back Row: E. Reynolds, J. Keller, B. Edwards, A. Barry, L. West, W. Robinson.
Front Row: A. Lambe, F. Starr, S. Brisco, L. Pancer.

IV Baseball Team

The S.P.S. Fourths, famed far and wide as the slap-happiest baseball team that ever made seven errors in one inning had a very successful season. The team went into intensive training at their camp at Hart House, Toronto, on November 1st, 1939, and after a tough two month training session, with all the players in the pink and only slightly under the influence, the team hit town with a thud and proceeded to walk away with the Opening Day game by a 6-1 score. Aerial Navigation and U.C. were the next victims in quick succession, both being beaten to a pulp and snowed under by a barrage of hits, runs, and errors. Then, believe it or not, the team suffered a double loss to Meds and Aerial Navigation. In this latter game, the team managed to pound out 12 runs and were only nosed out by a last minute raid consisting of 8 runs appearing out of thin air. The final score was 13-12 for the "Air" men.

"Dizzy" Robinson—Ace chucker and hairy chested strike-out king.

"Jock" Waite—The All-American ball catcher. Strapping first baseman with an elastic stretch for low ones.

"Shooting" Starr—The only serious ball player on the team, played every position and made mistakes in all of them.

"Home-Run" Pancer—Was an integral part of the Million Dollar infield. When he didn't strike out, he knocked up a few flies.

"Swingy" Brisco—Hard-hitting, harder-talking catcher, who handled the pitchers with kid gloves. Only made 141 errors all season.

"Benny Goodman" Lambe—The King of Swing really carved up the ozone and occasionally connected for a solid smash.

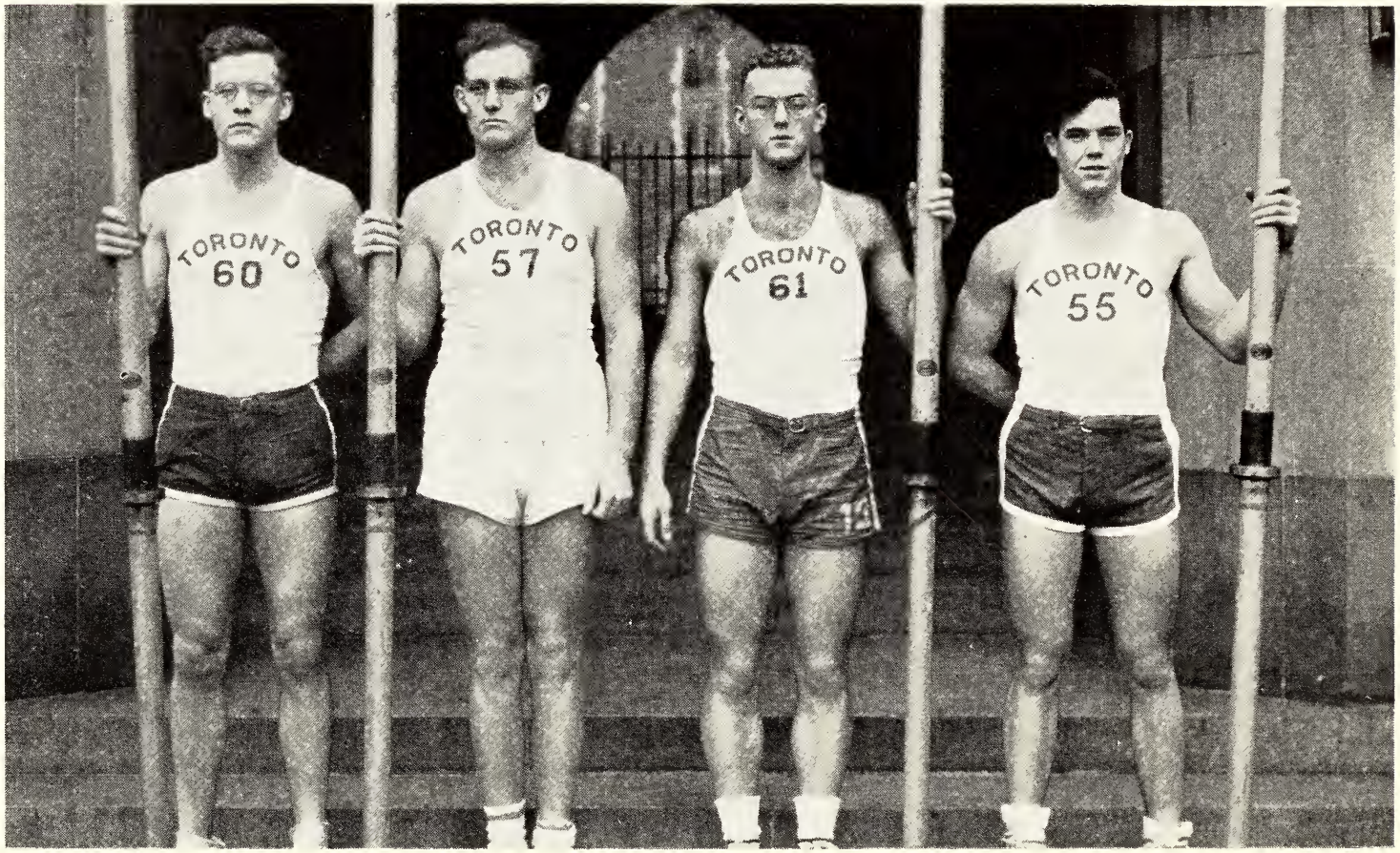
"Ducky-Wucky" West—Was valuable as scenery in the outfield and almost caught a fly one day.

"Charlie" Keller—like his namesake, pounded out hits but ran the bases like a sleep-walker.

"Flash" Edwards—Held down second base and helped the cause along by making a clean pick-up in the second game.

Joe Reynolds—The Brain Truster masterminded the team through stormy seas and deserves the pennant for his efforts.

E. Reynolds,
Manager.



ROWING CREW—INTERFACULTY CHAMPIONS

R. Scott, K. Gow, W. Bryce, H Godefroy.

S.P.S. Rowing Crew

This is the second time, in as many years, that School has won the Intramural Championship. Of last year's crew, only Bryce was again in the shell. Incidentally, it was just the fact that he was forced to be out of town, last summer, that kept him out of Leander's Canadian Championship eight.

Stroke Bob Scott, rowed number seven in the Argonaut crew, that trained for five hard weeks from Putney-on-Thames last summer, won two heats, only to bow to a machine-like Harvard crew.

Ken Gow and Hugh Godefroy were comparatively inexperienced. They were both sweep-swinging in Argos Junior heavy eight last summer.

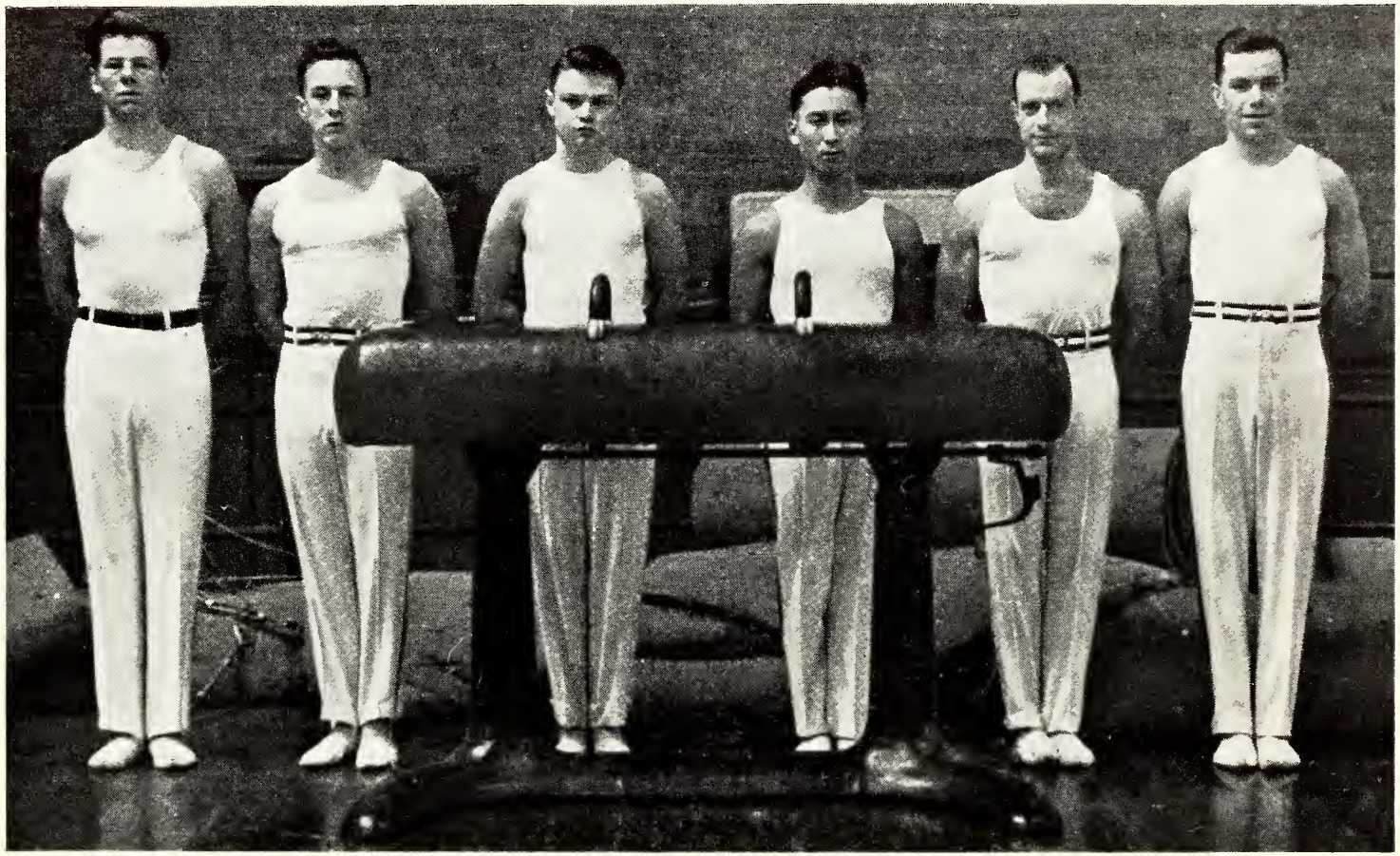
In their first heat they were leading U.C.'s first crew and Vic's second crew by two lengths at the finish. In the semi-finals, neither the first crew from Meds or O.C.E. threatened them once. In the final, pushed by a hard-working Victoria crew and Meds second crew, they broke into a sweat, to win by three lengths.

The second School crew, stroked by genial John McGrath, were not quite so successful. Doug Johnson, Warwick Steeves, and Wes Harris weren't in the same condition as McGrath and they couldn't match his pace in a sprint. They bowed to Vic's first crew in the semi-finals.

After steering his crew to the dock, Godefroy stepped out of the four and into a single to win the open singles race handily.

So, for another year, School rules the waves and keeps in its possession the McGill Barber Pole.

Ted. Nokes,
Manager.



GYMNASTICS

D. Craig, M. McMurrich, K. Jackson *(Junior Team);* W. Mark, L. Patterson, T. Jull *(Senior Team).*

The Gym Teams

Gymnastics is fast becoming as popular a sport among the Canadian Universities as it is in American and European institutions.

For many years School has been well represented in this art of muscle, mind and nerve, but with doctor's orders excluding Bill Lester, the Senior Team had a lean year in the Interfaculty. Bill was a former Intercollegiate Champ, having won both the Werry Cup and the Donald M. Barton Memorial Trophy in his three years activity here.

Lorne Patterson, former winner of the D. M. Barton Trophy, and runner-up for the Intercollegiate Championship last year, was runner-up to the Interfaculty Championship. He is now in his fourth session in Intercollegiate work as School's only representative on the Blue Team.

Willie Mark is still the most outstanding exponent of the slow movements in the Province, as is attested by his Provincial Championship on the Rings, where he is the only Canadian ever to have mastered the "Crucifix".

Tommy Jull, one of last year's winners in the Junior division, made a very creditable showing in his first year as a Senior, and is likely Intercollegiate material for the coming season.

It is interesting to note that S.P.S. had three Junior Teams entered in the Junior Interfaculty, and were successful in taking first and second places.

Outstanding in the Juniors was Dave Craig who took the Interfaculty Championship. This lad from Quebec, along with his team mates Norm McMurrich and Keith Jackson, shows real promise of becoming good senior material next year.

As one of the most exacting of sports, demanding constant application of the science of motion, it is readily understood why Schoolmen are attracted to its various activities. Perhaps the Varsity can call the participants a bunch of jumping gymnasts, but one who knows the sport terms them "experts in the dislocation of their centres of gravity".

The boys have expressed their appreciation to their coach, Charlie Zwygard, who has always given School his keenest interest and heartiest support.

L. A. Patterson,
Manager.

BOXING AND WRESTLING

Front Row: J. Mees, J. Buchan, W. Ramore, W. Schwenger, B. Davis, *Manager;* W. Lindsay, M. Swick, F. Dobson.
Back Row: N. Mustard, B. Scott, J. Stirling, E. F. Clarke, R. Dailey, J. Coughlin, J. Cutt, J. Greenberg.

S.P.S. Boxing, Wrestling and Fencing Team

The men from the "Little Red School House" again this year were the men that made the Varsity on the B.W. and F. teams. This year both the manager and assistant manager of the Varsity boxing and wrestling team were Schoolmen, with Jack Buchan and Dave Stewart sharing the honors.

At the time of this writing, School has had no less than twelve men make trips with the Varsity team to various boxing and wrestling meets.

On the Varsity Fencing squad, Garcia, holder of three Intercollegiate championships, is representing School. In a recent trip to Buffalo, he won all seven of his matches.

In wrestling it will be School all the way. Jack Cutt at 118 lbs., Neil Mustard at 125 lbs., Frank Dobson at 135 lb., Joe Bullando at 155 lbs., and Bill Schwenger at 165 lbs., will probably all make the Intercollegiate Meet. Mustard, Dobson and Schwenger already hold Intercollegiate titles.

At the Novice Assault held on February 2nd and 3rd, School did well but lost the Davidson Cup to Vic by only five points. In the past years the Davidson Cup has been presented for the Senior Assault, and had that been done this year, School would have received it again. We have held it for the past three years.

As the Cup was presented to the Novices this year, (there was no Senior Assault), the Schoolmen fighting for the Varsity were not allowed to compete. This did, however, bring a lot of new Schoolmen to the fore.

In boxing, Jimmy Coughlin at 175 lbs. took the championship and O'Donnell at 165 lbs. reached the Finals.

In wrestling, Lindsay at 135 lbs., Sterling at 155 lbs., and Scott at heavyweight, all took championships, and Greenberg, Rodzik, and Wachsmuth reached the Finals.

On the final night, Bonham and Greenop were at the fore for the Novice Fencing Tournament.

The boys from School have always distinguished themselves in B.W. and F. work, and we are proud of our team in this sport.

Our loss of men this year due to graduation is luckily limited to two. Miners Bill Schwenger and Garcia will graduate.

B. L. Davis,
Manager.

SWIMMING

Back Row: F. L. Galan, P. B. McCrodan, D. Muller, W. J. Staples.
Front Row: J. Shales, W. H. McLaren, D. C. Jennings, J. M. Girvan, D. G. Harkness.

S.P.S. Swimming

Although for the first time in three years School lost both the Junior and Senior swimming titles, nevertheless, more enthusiasm was shown than for many years past. Large turnouts for the Junior Meet in November and for the Senior Meet in January made up in quantity what was lacking in quality.

For the Junior Meet, many enthusiastic Freshmen turned out and managed to take a third place behind U.C. and Meds. Points were made for School by Galan in the 50-yard free style, and by the medley and free style relay teams.

In the Senior Meet, School fielded a full team of 15 men, placing one or more men in the final of each event. Again School, after holding grimly to the leaders up until the last relay, at which time any of three teams could have won the Meet, dropped behind U.C. and Meds to take a third place. The scoring was 26, 20, 18, respectively. Point scorers for School were Staples, Girvan and Galan, a second in the medley relay; Dobson, a third in the diving; McLaren, a third in the 440-yard free style; Staples, a first in the 100-yard backstroke; Girvan, a first in the 200-yard breast stroke; and Muller, Staples, Galan and Jennings, a second in the free style relay. Galan and Jennings in the 50-yard free, Harkness in the 100-yard free style, and a valiant "B" free style relay team of Shales, Harkness, Meilson, and McCrodan, made up the "also rans".

S.P.S. was well represented in Intercollegiate swimming. On the Championship Senior team, Staples and Girvan were on the winning medley relay team as well as winning the back and breast stroke races respectively. Galan was a member of the winning free style relay team as well as swimming in the 50 free. On the Intermediate team Shales, Muller and McCrodan represented School.

Although this was an unsuccessful year as far as championships are concerned, much enthusiasm was shown, many promising Freshmen were uncovered and together with the Intercollegiate veterans these should see the Fitzgerald Trophy safely back in the Little Red School house by next February.

D. C. Jennings,
Manager,

PROFESSOR T. R. LOUDON

Professor Loudon of the department of Civil Engineering has been appointed head of the R.C.A.F. School of Aeronautical Engineering which opened on March 18th, in Montreal, in connection with the British Commonwealth Air Training plan.

Professor Loudon has been interested in flying for some years. In 1928 he and associates at the University formed their own flying club. He holds a private pilot's license, having to his credit 19 hours of dual and 51 hours of solo flying—making his first solo in 1936. He is president of the Toronto Flying Club, and is the man who was largely responsible for the establishment of aeronautical courses at School. He has considerable experience in, and has lectured on the theory of flight, air navigation, stress analysis, and airplane design. At the Montreal training School he will hold the rank of squadron leader and will have a staff of instructors under him.

Courses at the Air Force School will extend over a period of six months, and will include instruction of 36 officers for general supervision and maintenance of planes. They will be trained to handle disposition of planes and serviceability, and on completion of their stay at Montreal, they will be posted to various training schools and depots throughout the country.

To say that School will miss "Tommy" Loudon is to put it only too mildly. Since the year 1906 he has been a popular and influential figure about the old red schoolhouse. The men he has taught during all these years, join with us all who are here at present, in wishing Tommy the very best of success in his new undertaking.

LT. JOHN E. WILLIAMSON

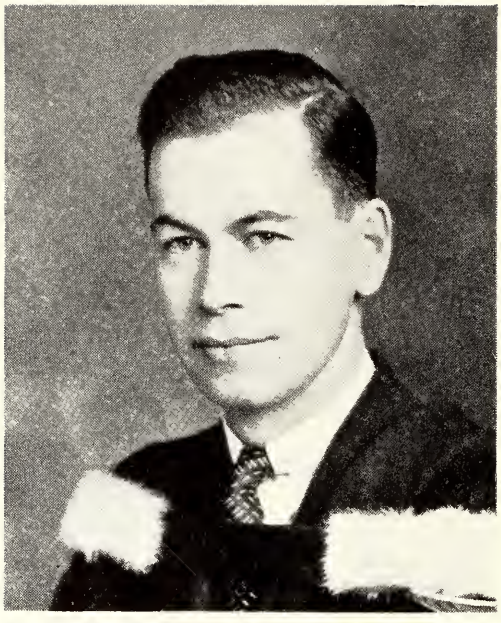
John E. Williamson, fourth year student in Metallurgical Engineering, was appointed second lieutenant to the Royal Canadian Ordnance Corps on Friday, February 16, 1940.

Jack started life in Quebec City, Sept. 19, 1913. The year 1926 found him in Bolton Junior High School and later E.T.H.S. at Evanston, Ill., where he studied dramatics. Returning to Toronto in '29, he won the Ontario High School Championship honours in fencing and corralled enough subjects at Humberside C.I. to matriculate at seventeen.

His business career started in construction at Belleville, followed by a year in merchandising. The North country called, and after a month or more on the bull gang at Inco's Copper Concentrator, his abilities were recognized and he was transferred to the company's research laboratory.

The desire for further education brought him back to School in 1935 for a course in Mining, but following summer employment in the research labs at Port Colbourne Refinery and Lake Shore Gold Mine, he changed horses in third year to study Metallurgical Engineering. Always active in School life, Jack participated in School Nite, was Vice-Chairman of the M & M Club, active in the Debates Club, and was the most successful of Business Managers for Transactions and Year Book.

He took military studies in Evanston and received his first commission in the C.O.T.C. at Humberside Collegiate. Holder of certificates A and B in Artillery, Certificate A in Artillery Survey, Jack was an instructor in artillery for the C.O.T.C. at the time of his appointment to the Ordnance Corps.

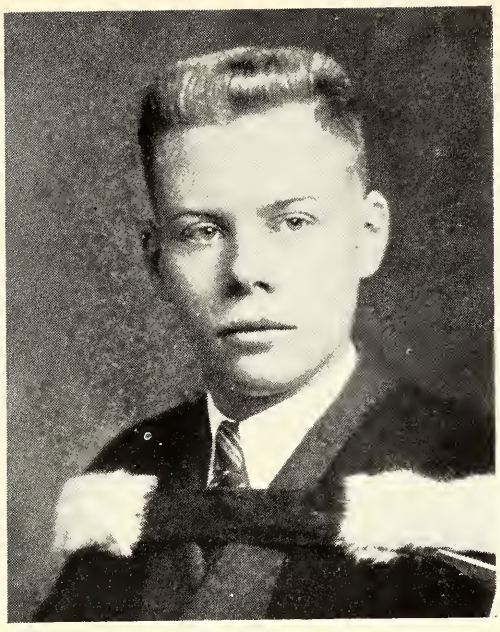


LT. H. J. M. BUTTERILL

H. J. M. Butterill, a student in fourth year Metallurgical engineering, received his appointment to the Royal Canadian Ordinance Corps as Second Lieutenant on Friday, February 16th. 1940.

The stork dropped in on Havelock, Ont., November 22nd. 1913, and left Hal as a memento of his visit. Since that eventful night Hal has sought that well-known bird with the long bill from James Bay to Vancouver, but has been unsuccessful in his quest thus far. He came to the Big City in 1914 and except for a two-year trial at London, Ont., received his early education here. At Humberside Collegiate he played basketball on the team that went through to the Dominion championship. Senior matric in hand, he blew into the gold camps of the North, but soon abandoned prospecting in favour of surveying the shores of Hudson Bay.

Tiring of trees, the autumn of '35 found "Butch" surveying the campus co-eds with the Metallurgists. Always a snap shot with the rifle, he earned first prize in the C.O.T.C. for high score and received his "A" certificate in artillery. He was quartermaster of the Varsity Band, served on the School At-Home committee, was secretary and treasurer of Delta Tau Delta. According to rumours from Petawawa, his chief worry is trying to find his batman to keep those buttons shining in that à la Butterill fashion.



LT. LOUIS M. SEBERT

Louis Mason Sebert first breathed the breath of life on November 11th, 1916, in London, Ontario. He practised this for some years until it occurred to his father that he should widen his scope in life. To accomplish this they sent him to St. James School, Toronto. In the normal course of events he completed their course and was sent to U.T.S., Toronto.

At U.T.S. besides breathing and broadening his scope, he took a very active interest in cadets and military affairs. This interest has stayed with him to the present day. It is also suspected that while our young hero was at U.T.S. he became interested in women—possibly.

During 1934-35 he joined the 9th Field Bty., R.C.A., as a signaller, and spent two summers training with them at Petawawa. It is possibly at this point in his career that he acquired his interest in the Artillery.

It was in the Fall of '35 that he first enrolled in School as a hopeful in Mining Engineering. His career as a student, although not brilliant, was steady, but in the C.O.T.C. his efforts were rewarded with a commission in the corps in his fourth year. In the C.O.T.C. he held the A. and B. certificates for Artillery. His other interest while at School was soccer.

He is a member of Delta Tau Delta Fraternity, Newman Hall, and Junior member of R.C.Y.C. while at school and gave strong support to all of them.

His summers while at school were spent up in the mines. The first two at Lake Shore and the third at Frood. At this work it appeared he had acquired a third interest.

So to you Lou, we say, "Carry on, Sir."

U. of T. C.O.T.C.

HEADQUARTERS: 119 ST. GEORGE STREET

The Canadian Officers Training Corps 1939-40

The opening of the Session 1939-40 once more found Canada at war, and probably no organization inside the University felt the full implication of all it meant as did the University of Toronto Contingent, Canadian Officers Training Corps. It is true that that Corps was in a much better position to meet the demands made upon it than it would have been a year earlier, but facilities designed to accommodate a strength of Three Hundred were inadequate to cope with six times that number.

After years of effort on the part of some who were intensely interested in the work of the Corps, a long-hoped-for dream was coming true in the summer of 1939. The Board of Governors of the University, always sympathetic to the C.O.T.C., had purchased early in 1939, the property at 119 St. George Street, for the Corps' use. Plans were drawn in the spring, the contract let, and work started early in the summer on a drill hall at the rear of the property which, together with the house, was to form Headquarters. The drill hall was to be completed, together with the alterations to the house, in time for the opening of the Session, and the Corps could then say goodbye to 184 College Street, which had been its home for so many years. The new drill hall, with the additional facilities in the house, was expected to give excellent accommodation for peace time, with the necessary offices, stores, and lecture rooms.

However, the outbreak of war changed many things. The drill hall and alterations were completed on schedule, and it was with a great deal of satisfaction that the Corps felt itself as well prepared as it was, so far as physical accommodation was concerned, to cope with what was ahead.

Previous to the opening of the Session, notification was received that the Infantry drill was changed and that the old "form fours" would disappear, and the new "three rank" drill would take its place. As this was new to practically all Officers and N.C.O.'s, special classes were held about the middle of September to train instructors, in order that there might be no delay in starting training.

The rush to join the Corps started with registration, and there were hundreds of requests from outside the University for permission to enlist. Authority was given to take on graduates

LIEUT.-COL. H. H. MADILL

MAJOR W. S. WILSON

of any University, in addition to the undergraduates of our own University. Within two weeks about One Thousand Three Hundred undergraduates and Five Hundred graduates had joined, and it was necessary to stop taking on recruits, or the strength could probably have been doubled.

Training for the War Office certificates "A" and "B" was discontinued, and the syllabus of training as laid down for promotion to Lieutenant in the non-permanent Active Militia was entered upon. The classes were divided into two groups, those wishing to qualify in one year and those qualifying in two years. Those qualifying in one year were largely senior students and graduates, while those who were in the junior years went into the two-year course.

Two written papers are required, the first one common to all arms, the second one "special to arm". The first paper for the one-year course was written the middle of December, and the first paper for the two-year course, and the second paper for the one-year course were written the middle of March.

Instruction is provided in Artillery, Engineers, Signals, Infantry (Rifle), Infantry (Machine Gun), Ordnance, Ordnance (O.M.E.), Army Service Corps, Army Medical Corps, and Army Dental Corps. Numerous offers were made by former Officers to assist with the instruction of the large numbers. It was possible to make use of a few of these, but in many cases, the

offer had to be gratefully declined. The generous offers of assistance, however, were much appreciated.

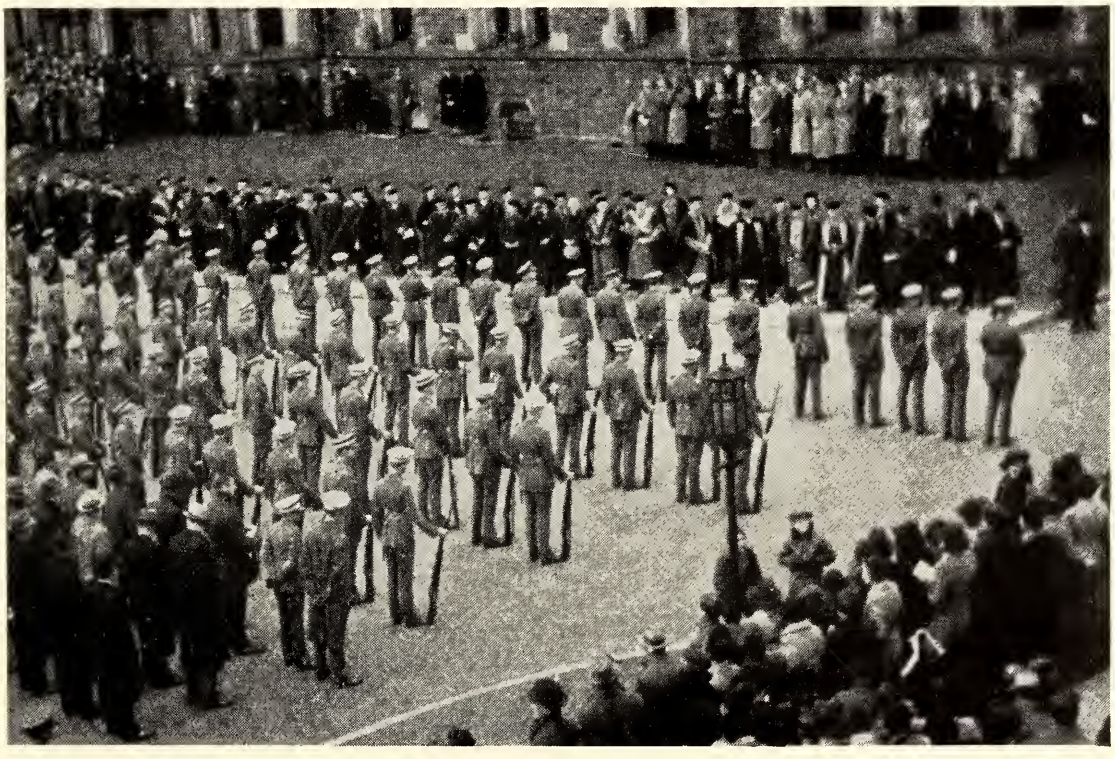
The Corps was reorganized as twelve companies, eight being undergraduates, and four graduates. As usual, there were large numbers from the Faculty of Applied Science and Engineering, and about Three Hundred undergraduates were enlisted.

The Contingent paraded on November 11, 1939, to the Memorial Service at the Soldiers' Tower. This was the only occasion during the session when the entire Corps turned out as a unit.

The C.O.T.C. Ball, which has become one of the outstanding social events around the University, was held at Hart House, on January 12, 1940, and, as usual, was a very successful function, and was much enjoyed by all who attended.

The annual inspection was held during the latter part of February and differed from others in that no formal inspection was held and the various classes were examined as they carried out their "special to arm" training.

When candidates have passed their first and second papers, it is still necessary for them to pass the practical examination.



REMEMBRANCE DAY

Arrangement will be made to take this, either at local headquarters, or at camp in June. It is proposed to go to Niagara Camp from June 10 to June 23, and a strength of Three Hundred has been authorized to attend.

The Session drawing to a close has been marked with intense interest and seriousness on the part of the cadets taking the instruction, and tolerance of the difficulties and drawbacks under which the instruction was given. It was also marked with the devotion of those giving the instruction, who have sacrificed their own time and energy, often to the exclusion of all else, in order that the need might be met.

Lieut.-Col. H. H. Madill, V.D., Head of the School of Architecture, commands the Contingent, and Major W. S. Wilson, Secretary of the Faculty of Applied Science and Engineering, is second in command. Major M. B. Watson, Director of the Department of Military Studies, is chief instructor. The Applied Science Companies are in charge of the following:

C 1 Coy —Capt. W. H. Bonus.
C 2 Coy —Capt. G. T. Hodgson.
M Coy (graduates) —Capt. E. G. Moogk.

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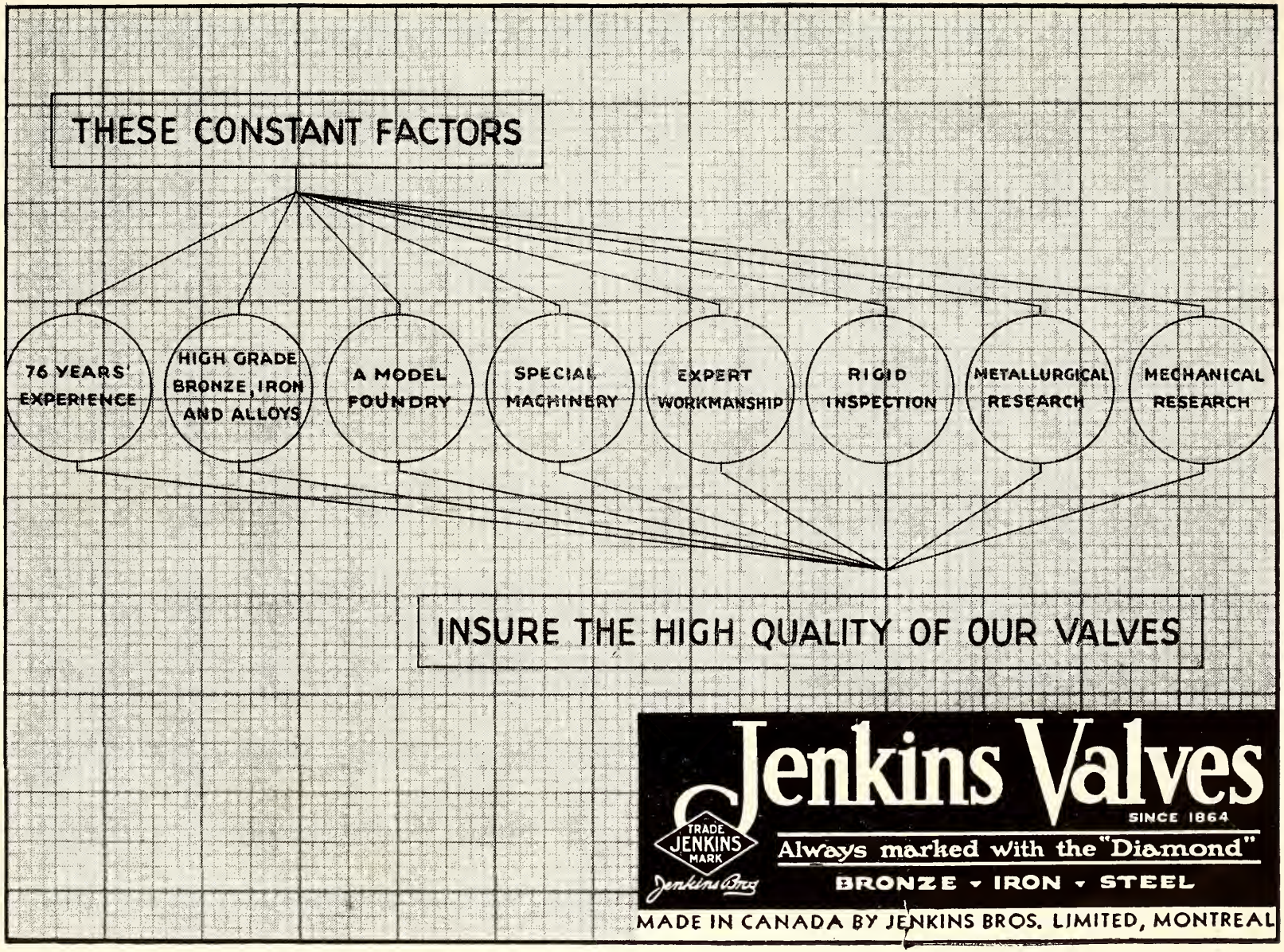
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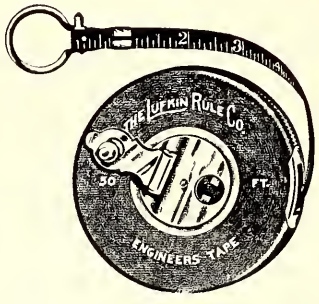

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